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equipment associated with manufacturing technology functional categories. For the items being reworked, those elemental or sub-elemental operations which were most costly (viz, "cost drivers") were identified, ranked by aggregate cost for all NAVAIREWORKFACs, assembled within a data base, and presented in this Final Report.

Conclusions and recommendations resulting from the study are presented.

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MANUFACTURING TECHNOLOGY COST DRIVERS STUDY OF AIRCRAFT REWORK, OVERHAUL AND REMANUFACTURE PROCESSES

VOLUME I - FINAL REPORT



JANUARY 31, 1979



02-1374

EXECUTIVE SUMMARY

The naval air rework facilities (NAVAIREWORKFACS) perform the highest (i.e. depot) and most inclusive level of maintenance on naval aircraft and aeronautical equipment. Inasmuch as the costs of performing this level of maintenance are substantial, the NAVAIREWORKFACS have continually sought ways of increasing cost effectiveness and industrial productivity. Toward this end, a requirement was established to study the aircraft rework, overhaul and remanufacture processes at the six (6) naval air rework facilities to identify those processes which represent the highest total cost of doing business in the organic depot naval air maintenance community. Any process, function or part which contributed significantly to the cost of an operation was defined as a cost driver. A study team, commissioned by the Chief of Naval Material, completed the cost drivers study on 31 January 1979. The results are summarized as follows:

Manufacturing technology (MT) functional categories were defined which were universal and applicable to all NAVAIREWORKFACS. The "top seven" most costly direct labor functional categories, which represent 72% of the total direct labor costs, were:

- Electrical/Electronic (20.9%)
- Disassemble/Assemble (16.7%)
- Sheet Metal (13.8%)
- Testing (6.9%)
- Machining (6.0%)
- Hydraulic/Pneumatic (4.7%)
- Strip/Finish/Paint (4.0%)

The "top seven" most costly direct material functional categories, which represent 63% of the total direct material costs, were:

- Electrical/Electronic (16.2%)
- Disassemble/Assemble (13.3%)
- Hydraulic/Pneumatic (11.7%)
- Machining (6.7%)
- Sheet Metal (6.2%)
- Helicopter Dynamic Components (4.6%)
- Compressor/Turbine/Engine Metal Repair (3.9%)

The most costly direct labor rework programs were:

- Aircraft rework
- Component F/E material rework

The most costly direct material rework programs were:

- Component F/E material rework
- Engine rework

The most costly numerical control machine operations were:

- Machining center
- Lathe

The most costly conventional machine operations were:

- Grinder
- Lathe

A production shop survey, covering more than 7,500 direct labor people at the NAVAIREWORKFACs, was made to investigate the "top seven" functional categories in greater detail. Process elements were identified within each of the "top seven" functional categories. Those process elements which accounted for the highest costs within that functional category were referred to as "elemental cost drivers". By considering only the "top five" elemental cost drivers within each of the "top seven" functional categories (i.e., thirty-five total elemental cost drivers), 44.5% of the total direct labor costs were covered.

Direct labor costs are more susceptible to NAVAIREWORKFAC management action than are direct material costs. These latter costs are primarily affected by material acquisition managers. Both direct labor and direct material cost drivers should be reviewed to identify opportunities for the application of manufacturing technology.

The results of this study can also be applied in other phases of NAVAIREWORKFAC operations, including:

- Staffing plans
- Training plans
- Equipment acquisition

- Facility construction
- Plant arrangement
- Handling and transportation
- Support functions

FOREWORD

In consideration of the recent DOD and Navy emphasis on manufacturing technology as an approach to improving industrial productivity, three study initiatives were sponsored by the Chief of Naval Material (MAT-08E4) covering the following areas:

- (New) Aircraft Manufacture
- Air-Launched and Sea-Launched Weapon Systems
- Aircraft Rework, Overhaul and Remanufacture Processes

Each study initiative was focused on identification of cost drivers involved in each program. Having identified the pertinent cost drivers, it would then be appropriate to apply manufacturing technology wherever possible to achieve improvements which would result in improved productivity. The intent of this approach was to concentrate on improving processes rather than make changes to products.

In implementing the NAVMAT initiative on aircraft rework, overhaul and remanufacture processes, a manufacturing technology (MT) study team was identified in Sept. 1977. It was composed of knowledgeable representatives from each of the six naval air rework facilities (NAVAIREWORKFACs) and an MT Study Director from NAVAIREWORKFAC North Island. As was true for each of the other initiatives noted above, it was decided to support this MT study team with a support

contractor. Following a competitive solicitation, Systems Consultants, Incorporated was selected to be the MT study support contractor.

The planned approach to identifying cost drivers was to first stratify the overall NAVAIREWORKFAC effort into meaningful MT functional categories classified by both NAVAIREWORKFAC and by rework program. These data would then be analyzed in more detail to identify viable candidates for manufacturing technology applications. Wherever possible, existing reports were to be utilized. In exceptional circumstances, special reports could be made.

The MT study team and study contractor visited each of the naval air rework facilities located at:

- Alameda, CA
- Cherry Point, NC
- Jacksonville, FL
- Norfolk, VA
- North Island, CA
- Pensacola, FL

These visits assisted substantially in clarifying interpretations of data requirements and also in expanding the vistas of the participants. In fact, the team approach to the problem contributed to the synergistic outcome.

Cost drivers were identified from reports and data available at the various NAVAIREWORKFACs. Some types of reports were common and available at all NAVAIREWORKFACs and

some were unique and existed only at one or several of the NAVAIREWORKFACs. Both common and unique types of reports were used in the study. Data from these reports were analyzed, and cost drivers were identified.

The cost drivers are documented in two volumes. Volume I, this volume, contains a complete discussion of the study methodology and the results of the data analyses. All results have been normalized and are presented as percentages in this volume. Volume II, separately bound, is an addendum which constitutes the data base for this study.

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SECTION I

INTRODUCTION

The United States has led the world in industrial productivity for many years. Furthermore, in terms of relative industrial productivity, the U.S. also led the world in growth for two decades after World War II. Since 1967, however, the rate of productivity increase within the U.S. has suffered in comparison with that of other industrial countries. Within this past decade, Japan's output per person-hour has grown 105%, West Germany's 62%, France's and Italy's 54%, and Canada's 39%. Even Great Britain's 25% increase has surpassed the 22% increase for the U.S.^{1/} This lagging rate of increase has become a matter of national concern, and appropriate corrective action is both warranted and needed. In addressing this problem, it is desirable to identify appropriate and significant factors. According to Professor Edward Denison of the Brookings Institution,^{2/} factors affecting productivity and their individual contribution to productivity growth are:

- Technology - 38.1%
- Capital - 25.4%
- Labor Quality - 14.3%

^{1/} Kimzey, Charles H. - "National Center for Productivity and Quality of Working Life" - Ninth Annual Tri-Service Manufacturing Technology Conference, Orlando, Florida, 3-7 October 1977.

^{2/} Harr, Karl G., Jr. - President, Aerospace Industries Assn. - Speech before American Astronautical Society, Houston, Texas, 1 November 1978

- Economies of Scale - 12.7%
- Resource Allocation - 9.5%

From this point of view, the greatest opportunity to improve productivity exists through considerations of technology. Technology is involved both in the design of an end-product and also in the means of producing that end-product. The field of manufacturing technology focuses on the means of producing end-products. The Naval Material Command has defined manufacturing technology (MT) as:

"effort directed toward the establishment of a new or the improvement of existing manufacturing processes, methods, techniques or equipment to reduce the costs of defense material and/or weapon systems by providing first-of-a-kind application to industrial scale operations. Remanufacturing operations are appropriate within the context of new technology application. This embodies the application of manufacturing know-how to the acquisition and life cycle of defense material. The techniques or process tooling employed are production oriented and are based on Research and Development demonstrated feasibility or extrapolation of existing technology. Manufacturing technology is a process oriented function and is not directed at design changes in the weapon system hardware as in value engineering, but instead to the processes which result in the fabrication/production of that hardware. It does include new methods of producing or processing basic materials required for fabrication of hardware."

Recognizing the importance of manufacturing technology, management of the Navy's MT program has been centralized in the Office of Director of Manufacturing Technology under the Chief of Naval Material. Within the past year, several manufacturing technology (MT) studies have been initiated. The intent of these studies is to identify high cost manufacturing areas affecting the Navy's community of interest and then to address

those areas wherein appropriate MT efforts appear to present investment opportunities. Three related cost driver studies, including this study, currently in process are:

- (New) Aircraft Manufacture
- Air-launched and Sea-launched Weapon Systems
- Aircraft Rework, Overhaul, and Remanufacture Processes

The Aircraft Rework, Overhaul and Remanufacture Processes Study began in September 1977 with the appointment of the Depot Overhaul MT Team Study Director and MT Team members from each of the six naval air rework facilities (NAVAIREWORKFACs). Following a competitive procurement solicitation, an MT study support contractor was selected and work commenced in May 1978. The results of this cost drivers study are contained in this final report. The report consists of Volume I - Final Report and Volume II - Addendum. All cost driver data presented in Volume I are in percentages (i.e., normalized). Volume II constitutes the study data base.

The data base which was developed and used during this study was composed of actual cost or utilization figures. Furthermore, the period covered by the data base was longer than the in-process time for almost all of the items being reworked and thus was representative of completion cycle processes. For this reason, the six month period from July 1, 1977 to December 31, 1977 was selected as the base period. In general, data obtained from each NAVAIREWORKFAC

conformed to this desired time period. In those instances where this was not possible, the input data time period has been noted on the individual report figure.

To minimize disruption of NAVAIWORKFAC operations, existing reports were used wherever possible as input sources to the data base. Thus, only in the final stage of the study was it necessary to obtain data through use of a special report. This involved the design and completion of a shop survey form. This will be discussed at greater length in Section VI.

SECTION II

DIRECT COSTS SYNTHESIS AND ANALYSIS

Cost data for this study were collected for each rework program at each of the six naval air rework facilities (NAVAIREWORKFACs). The facilities were located at:

- Alameda, CA.
- Cherry Point, N.C.
- Jacksonville, FL.
- Norfolk, VA.
- North Island, CA.
- Pensacola, FL.

The rework programs at these facilities cover the following:

- Aircraft rework
- Missile rework
- Engine rework
- Component F/E Material rework
- Other support
- Manufacturing

Within each of these program categories, voluminous cost data existed which related to completed products within that program. All planning, workloading, budgeting and controlling of work have been related to the completion of identifiable products within each program at each facility. However, data did not generally exist to identify the cost of the various processes which were involved in completing the

far-ranging spectrum of NAVAIREWORKFAC products. Thus the first task of this study was directed toward establishing MT functional categories which could provide a rational basis for the collection of process costs. After several iterations, these MT functional categories were established as shown on Figure 1. Although most of the functional categories are self-explanatory, certain amplifying remarks are in order, viz.:

- Disassemble/Assemble - Refers primarily to aircraft and engine work performed on the 950/960 Division shop floor. Inasmuch as possible, electrical or sheet metal work done by the 950 Division is allocated separately to the appropriate MT functional category.
- Wire Cut/Manufacturing - Refers to electrical cable manufacture.
- Testing - Refers to aircraft line testing, engine test cell operations, or other operations being performed in the test of the product. Does not generally include in-process testing which is incidental to other significant MT functions.
- Miscellaneous - Armament - Includes Oxygen shop operations as well as other operations involving explosives inasmuch as the manufacturing operations and safety considerations are similar. Does not include ejection seat pyrotechnics.

FIGURE 1
DIRECT LABOR
1 JUL 77 - 31 DEC 77

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY	PERCENT BY PROGRAM								PERCENT BY NAVAIREWORKFAC						
	COST DRIVER RANKING	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
EXAMINATION/EVALUATION	8	4.3	2.4	6.4	2.3	3.3	0.5	3.6	6.7	4.9	1.1	3.1	3.0	2.4	3.6
DISASSEMBLE/ASSEMBLE	2	26.1	12.7	34.3	2.8	7.2	0.6	16.7	11.6	25.9	9.4	19.2	20.5	12.0	16.7
ELECTRICAL/ELECTRONIC	1	15.6	7.5	4.9	36.4	14.4	3.5	20.0	18.2	18.8	23.0	19.0	18.4	25.8	20.0
HYDRAULIC/PNEUMATIC	6	1.6	-	7.1	10.8	1.5	0.2	4.7	11.4	6.3	3.4	2.5	1.7	4.3	4.7
BONDING	21	0.8	0.0	0.0	1.4	0.2	0.3	0.8	1.8	1.4	-	-	0.7	1.0	0.8
STRIP/FINISH/PAINT	7	6.3	1.8	1.6	2.1	2.6	3.4	4.0	3.9	4.2	7.1	2.4	4.0	4.3	4.0
WELD	19	0.3	0.0	3.2	0.9	0.9	2.6	0.9	0.8	0.9	1.7	1.3	0.6	0.5	0.9
MACHINING	5	2.4	0.1	14.9	6.1	5.0	29.8	6.0	5.8	5.3	6.3	5.9	6.4	6.3	6.0
WIRE CUT/MANUFACTURING	15	0.4	0.7	0.1	0.7	0.7	17.9	1.3	0.0	0.7	0.5	1.7	3.2	-	1.3
FORGE/FOUNDRY	30	0.0	0.0	0.1	0.1	0.4	3.0	0.2	0.4	0.4	0.1	-	0.1	0.3	0.2
LAYOUT/PATTERN	27	0.1	0.0	0.0	0.0	1.3	6.5	0.5	0.4	0.2	-	0.8	0.3	0.9	0.5
SHEET METAL	3	22.5	0.0	2.3	4.4	15.9	13.1	13.8	11.4	12.5	12.3	15.6	13.7	16.1	13.8
CLEAN, ABRASIVE	17	0.6	0.4	2.7	1.7	0.5	0.4	1.1	0.9	1.4	2.2	1.6	0.4	0.9	1.1
CLEAN, CHEMICAL	13	1.8	0.7	1.5	0.8	0.5	0.1	1.3	0.9	2.5	-	1.4	0.4	2.7	1.3
HEAT TREAT	28	0.1	-	0.8	0.7	0.2	1.7	0.4	0.2	-	0.2	-	1.2	0.5	0.4
PLATING	16	0.4	0.6	2.4	2.0	0.5	1.5	1.1	0.6	1.2	2.5	1.4	0.7	1.3	1.1
PACKING/PRESERVATION	12	0.4	0.0	1.1	2.3	8.4	0.6	1.9	2.6	1.7	2.9	1.4	1.1	2.3	1.9
CALIBRATION	9	0.2	0.0	0.0	4.2	16.6	0.0	3.1	4.3	1.5	4.1	1.9	4.5	1.8	3.1
TESTING	4	9.6	44.0	6.8	2.3	5.8	0.6	6.9	9.2	3.3	4.0	6.0	10.1	4.9	6.9
MISCELLANEOUS-															
ARMAMENT	11	1.5	28.9	0.4	2.7	1.7	0.2	2.1	2.6	1.0	2.7	4.2	0.6	1.5	2.1
BEARINGS	22	0.1	-	0.8	1.3	0.4	4.9	0.7	1.3	0.6	0.5	-	0.9	1.1	0.7
BLADES - PROP	26	0.0	0.0	2.1	0.7	0.4	-	0.5	-	-	0.4	2.0	-	-	0.5
ROTOR	20	0.3	-	0.0	2.5	0.1	0.1	0.9	-	3.7	-	-	1.6	0.6	0.9
CONTROL CABLES	36	0.1	-	-	0.1	0.1	0.3	0.1	-	-	0.0	-	-	0.3	0.1
EJECTION SEAT	31	0.2	-	0.1	0.3	0.3	0.0	0.2	-	-	0.2	0.9	-	-	0.2
FABRIC/RUBBER/PLASTICS	18	1.4	-	0.1	0.6	0.6	2.0	1.0	1.1	2.1	1.1	0.5	0.7	1.1	1.0
FLIGHT CONTROLS & SUBASSM.	29	0.8	-	0.0	0.0	0.1	-	0.4	-	-	3.8	-	-	-	0.4
FUEL CONTROLS & ACCESSORIES	14	0.8	-	4.1	1.4	0.9	0.1	1.3	-	-	3.5	4.0	0.4	-	1.3
GROUND SUPPORT EQUIPMENT	10	0.7	-	0.0	4.5	4.6	4.3	2.3	3.2	0.6	2.8	1.2	4.6	0.3	2.3
LANDING GEAR	25	0.6	-	0.0	0.9	0.2	0.1	0.6	0.8	0.9	0.5	0.4	-	1.2	0.6
MECHANICAL MODS. & REPAIR	34	0.0	-	-	-	0.7	-	0.1	-	-	0.7	-	-	-	0.1
COMPRESSOR/TURBINE/ENGINE	32	0.0	-	1.6	0.1	0.0	-	0.2	-	-	2.0	-	-	-	0.2
METAL REPAIR															
CYLINDER & PISTON	33	-	-	0.5	0.1	0.0	-	0.1	-	-	0.8	-	-	-	0.1
PROTOTYPE	35	0.0	-	0.0	0.0	0.1	1.0	0.1	-	-	-	-	0.2	-	0.1
FIELD SERVICE	24	0.0	-	0.0	0.5	3.8	0.7	0.6	-	-	-	1.6	-	1.4	0.6
HELO. DYNAMIC COMPONENTS	23	0.0	-	-	2.2	0.3	-	0.7	-	-	-	-	-	4.2	0.7
TOTAL	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

● Miscellaneous - Data was provided under the following "miscellaneous" MT functional categories by some, but not by all NAVAIREWORKFACs, viz.:

- Mechanical Modification and Repair
- Compressor/Turbine/Engine Metal Repair
- Cylinder and Piston
- Prototype
- Field Service
- Helicopter Dynamic Components

These categories generally reflected a significant workload at the reporting NAVAIREWORKFAC(s) but perhaps not at the others. Inasmuch as the final review determined that the data for these items had a secondary impact on the study objectives, no further effort was made to insure consistency for these miscellaneous items themselves among the NAVAIREWORKFACs.

After identifying the MT functional categories, it was then necessary to relate production shops to an appropriate MT functional category. For those shops which performed multiple MT functions, it was necessary to estimate the proportion of effort between (or among) the categories and then apportion the costs accordingly. Also, in the data collection phase, it was necessary to identify and shift costs between categories as definition clarifications dictated. This apportionment was accomplished through use of "peacetime capacity" factors applicable specifically to that NAVAIREWORKFAC.

Direct labor costs did not include production expense, G&A expense or any other type of indirect or overhead expense. Costs of section, branch or division offices were not included, inasmuch as they were overhead expenses. Costs were accumulated by program for each facility. A six month test period (7/1/77 - 12/31/77) was selected and costs were collected accordingly. Since data were not available at each NAVAIREWORKFAC covering this test period, three facilities provided data covering the periods noted, viz.:

- Alameda - 4/1/77 - 9/30/77
- North Island - 7/1/77 - 7/1/78
- Pensacola - 1/1/78 - 6/10/78

In the case of North Island and Pensacola, data were converted to a six month period through use of appropriate work-day ratios. Having apportioned the direct labor costs by MT functional category within both the rework programs and the naval air rework facilities, these costs were converted to percentages (i.e., normalized) and are given in Figure 1.

Direct material costs covered the same six month test period (i.e., 7/1/77 - 12/31/77) with the following exceptions:

- Alameda - 4/1/77 - 9/30/77
- Norfolk - 7/1/78 - 9/30/78
- North Island - 7/1/77 - 7/1/78
- Pensacola - 1/1/78 - 5/31/78

In the case of Norfolk, North Island and Pensacola, data were converted to a six month period through the use of appropriate work-day ratios.

After apportioning the direct material costs by MT functional category within both the rework programs and the naval air rework facilities, these costs were converted to percentages and are given in Figure 2.

Retaining the same stratification of data by MT functional category, rework program and rework facility as existed in Figures 1 and 2, the direct labor costs and direct material costs were added together, the sums converted to percentages, and the results given in Figure 3.

Inasmuch as the basic objective of this study was to determine cost drivers among the rework, overhaul and remanufacture processes, each MT functional category was ranked according to the total cost for all NAVAIREWORKFACs. The ranking is given on Figures 1, 2 and 3. For those MT functional categories which were apparently "tied", reference was made to the base data to provide the proper rank ordering.

Having determined the cost driver ranking among all of the MT functional categories, the "top seven" were selected for further analyses.

As given in Figure 1, the "top seven" direct labor cost drivers were:

1. Electrical/Electronic
2. Disassemble/Assemble

FIGURE 2
DIRECT MATERIAL
1 JUL 77 - 31 DEC 77

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY	PERCENT BY PROGRAM								PERCENT BY NAVAIREWORKFAC						
	COST DRIVER RANKING	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
EXAMINATION/EVALUATION	17	0.1	-	3.4	0.5	2.9	6.9	1.4	3.1	2.0	0.0	5.1	0.1	-	1.4
DISASSEMBLE/ASSEMBLE	7	16.7	1.6	36.3	4.7	4.7	1.3	13.3	11.8	25.2	10.1	26.7	6.8	6.6	13.3
ELECTRICAL/ELECTRONIC	1	14.6	11.5	1.3	24.4	16.3	2.8	16.2	15.5	14.0	20.0	14.9	16.8	15.6	16.2
HYDRAULIC/PNEUMATIC	3	7.9	-	7.4	17.2	2.4	0.2	11.7	32.7	9.6	5.8	7.2	8.5	13.3	11.7
BONDING	24	0.5	-	-	0.9	0.0	0.0	0.6	1.0	1.7	-	-	0.8	0.0	0.6
STRIP/FINISH/PAINT	22	2.0	-	0.6	0.5	0.3	3.9	0.9	0.1	3.4	0.1	1.2	0.0	1.2	0.9
WELD	23	1.3	-	0.9	0.4	0.7	1.7	0.7	1.4	1.5	0.5	0.8	0.4	0.3	0.7
MACHINING	4	2.8	-	5.6	8.9	3.0	9.4	6.7	0.8	6.9	0.9	2.0	10.4	12.8	6.7
WIRE CUT/MANUFACTURING	12	0.7	2.5	0.2	0.2	5.1	59.6	3.1	0.0	0.5	0.6	3.0	9.3	-	3.1
FORGE/FOUNDRY	33	0.0	-	0.0	0.0	0.0	0.4	0.0	0.0	0.2	0.0	-	0.0	0.0	0.0
LAYOUT/PATTERN	32	0.0	-	0.0	0.0	0.4	0.3	0.1	0.0	0.1	-	0.0	0.0	0.1	0.1
SHEET METAL	5	16.6	-	2.1	3.7	13.4	9.3	6.2	5.6	8.3	3.4	7.1	7.2	5.0	6.2
CLEAN, ABRASIVE	26	0.1	-	0.6	0.5	0.0	0.0	0.4	0.0	2.5	0.0	0.2	0.1	-	0.4
CLEAN, CHEMICAL	25	0.2	-	0.6	0.5	1.0	0.3	0.5	0.0	2.8	-	0.5	0.0	-	0.5
HEAT TREAT	18	0.1	-	5.1	0.5	0.1	0.0	1.4	0.2	-	0.0	-	4.9	-	1.4
PLATING	27	0.1	0.1	0.4	0.3	0.1	0.1	0.3	0.0	1.6	0.0	0.5	0.0	-	0.3
PACKING/PRESERVATION	19	0.0	-	0.9	1.3	7.8	0.7	1.3	2.6	3.4	1.5	-	1.0	0.3	1.3
CALIBRATION	14	0.9	0.0	0.0	2.8	13.3	0.0	2.3	2.2	0.5	1.5	1.2	5.4	0.8	2.3
TESTING	10	6.1	3.3	5.5	1.4	7.1	0.7	3.4	3.2	6.9	3.0	1.4	4.1	1.6	3.4
MISCELLANEOUS-															
ARMAMENT	8	4.3	81.1	0.2	2.9	5.7	0.3	3.8	5.5	0.7	3.8	10.0	2.2	2.6	3.8
BEARINGS	15	0.9	-	2.7	3.1	0.1	0.1	2.3	5.9	1.4	2.0	-	-	6.1	2.3
BLADES - PROP	28	0.1	-	0.1	0.5	-	-	0.3	-	-	0.3	1.5	-	-	0.3
ROTOR	9	2.7	-	0.1	6.3	0.1	0.0	3.7	-	4.5	-	-	9.9	1.7	3.7
CONTROL CABLES	31	0.2	-	-	0.0	0.1	0.3	0.1	-	-	0.0	-	-	0.4	0.1
EJECTION SEAT	29	0.4	-	-	0.1	0.8	0.6	0.2	-	-	0.1	1.2	-	-	0.2
FABRIC/RUBBER/PLASTICS	20	5.6	-	0.5	0.3	0.5	0.6	1.3	0.5	0.9	0.8	0.4	2.5	1.3	1.3
FLIGHT CONTROLS & SUBASSM.	30	0.7	-	-	0.0	0.0	-	0.1	-	-	1.0	-	-	-	0.1
FUEL CONTROLS & ACCESSORIES	11	1.2	-	7.4	2.2	4.1	0.0	3.2	-	-	7.1	11.9	1.4	-	3.2
GROUND SUPPORT EQUIPMENT	13	5.0	-	1.1	3.1	8.8	0.0	3.1	4.3	0.7	0.4	1.5	8.1	0.5	3.1
LANDING GEAR	16	5.9	-	-	2.0	0.3	0.0	2.0	3.4	0.9	2.2	1.5	-	5.2	2.0
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	7	-	-	13.8	1.6	0.7	-	3.9	-	-	27.9	-	-	-	3.9
METAL REPAIR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CYLINDER & PISTON	21	-	-	3.1	0.5	-	-	1.0	-	-	6.9	-	-	-	1.0
PROTOTYPE	34	0.0	-	-	0.0	0.0	0.3	0.0	-	-	-	-	0.1	-	0.0
FIELD SERVICE	35	0.0	-	-	-	0.1	-	0.0	-	-	-	-	-	0.0	0.0
HELO. DYNAMIC COMPONENTS	6	2.1	-	-	8.4	0.1	-	4.6	-	-	-	-	-	24.5	4.6
TOTAL	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FIGURE 3

DIRECT LABOR AND DIRECT MATERIAL
1 JUL 77 - 31 DEC 77

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY	COST DRIVER RANKING	PERCENT BY PROGRAM							PERCENT BY NAVAIREWORKFAC						
		AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
EXAMINATION/EVALUATION	11	3.2	1.2	4.3	1.2	3.1	3.7	2.5	5.3	3.3	0.5	4.0	1.5	1.2	2.5
DISASSEMBLE/ASSEMBLE	2	23.6	7.1	35.7	4.0	6.4	0.9	15.0	11.7	25.5	9.8	22.3	13.3	9.2	15.0
ELECTRICAL/ELECTRONIC	1	15.3	9.5	2.4	28.9	15.0	3.2	18.1	17.2	15.2	21.2	17.3	17.5	20.5	18.1
HYDRAULIC/PNEUMATIC	4	3.2	-	7.3	14.8	1.8	0.2	8.2	19.4	8.2	4.8	4.4	5.3	9.0	8.2
BONDING	26	0.7	0.0	0.0	1.1	0.1	0.2	0.7	1.5	1.6	-	-	0.7	0.5	0.7
STRIP/FINISH/PAINT	12	5.1	0.9	0.9	1.1	1.8	3.7	2.5	2.5	3.8	3.0	1.9	1.8	2.7	2.5
WELD	23	0.6	0.0	1.6	0.5	0.8	2.2	0.8	1.0	1.2	1.0	1.1	0.5	0.4	0.8
MACHINING	5	2.5	0.1	8.4	7.8	4.3	19.7	6.4	3.9	6.2	3.1	4.3	8.5	9.7	6.4
WIRE CUT/MANUFACTURING	15	0.5	1.6	0.2	0.4	2.2	38.6	2.2	0.0	0.6	0.5	2.3	6.4	-	2.2
FORGE/FOUNDRY	33	0.0	0.0	0.1	0.0	0.3	1.7	0.1	0.3	0.3	0.1	-	0.1	0.2	0.1
LAYOUT/PATTERN	30	0.1	0.0	0.0	0.0	1.0	3.4	0.3	0.3	0.1	-	0.5	0.1	0.5	0.3
SHEET METAL	3	21.0	0.0	2.2	4.0	15.1	11.2	10.1	9.2	10.1	7.0	12.2	10.3	10.3	10.1
CLEAN, ABRASIVE	24	0.5	0.2	1.3	0.9	0.3	0.2	0.8	0.6	2.0	0.9	1.0	0.2	0.4	0.8
CLEAN, CHEMICAL	22	1.4	0.4	0.9	0.6	0.7	0.2	0.9	0.6	2.7	-	1.0	0.2	1.3	0.9
HEAT TREAT	21	0.1	-	3.8	0.6	0.1	0.9	0.9	0.2	-	0.1	-	3.1	0.2	0.9
PLATING	25	0.3	0.3	1.0	1.0	0.4	0.8	0.7	0.4	1.4	1.0	1.0	0.3	0.6	0.7
PACKING/PRESERVATION	17	0.3	0.0	1.0	1.7	8.2	0.6	1.6	2.6	2.6	2.1	0.8	1.1	1.3	1.6
CALIBRATION	9	6.4	0.0	0.0	3.4	15.5	0.0	2.7	3.5	0.9	2.5	1.6	4.9	1.3	2.7
TESTING	6	8.7	23.4	5.9	1.8	6.2	0.6	5.2	6.9	5.3	3.4	4.2	7.0	1.2	5.2
MISCELLANEOUS-															
ARMAMENT	7	2.3	55.2	0.3	2.9	3.0	0.3	3.0	3.7	0.8	3.3	6.5	1.4	2.1	3.0
BEARINGS	18	0.3	-	2.1	2.4	0.3	2.5	1.5	3.0	1.1	1.4	-	0.4	3.7	1.5
BLADES - PROP	28	0.1	0.0	0.7	0.6	0.3	-	0.4	-	-	0.4	1.8	-	-	0.4
ROTOR	13	0.9	-	0.1	4.9	0.1	0.1	2.2	-	4.1	-	-	6.0	1.2	2.2
CONTROL CABLES	34	0.1	-	-	0.0	0.1	0.3	0.1	-	-	0.0	-	-	0.4	0.1
EJECTION SEAT	32	0.2	-	0.0	0.2	0.5	0.3	0.2	-	-	0.2	1.0	-	-	0.2
FABRIC/RUBBER/PLASTICS	20	2.5	-	0.4	0.4	0.6	1.3	1.1	0.9	1.4	0.9	0.5	1.6	1.2	1.1
FLIGHT CONTROLS & SUBASSM.	31	0.7	-	0.0	0.0	0.1	-	0.2	-	-	2.1	-	-	-	0.2
FUEL CONTROLS & ACCESSORIES	14	0.9	-	6.4	1.9	2.0	0.0	2.2	-	-	5.6	7.2	0.9	-	2.2
GROUND SUPPORT EQUIPMENT	8	1.8	-	0.8	3.7	6.1	2.2	2.7	3.6	-	1.4	1.3	6.4	0.4	2.7
LANDING GEAR	19	2.0	-	0.0	1.6	0.3	0.1	1.3	1.7	-	1.5	0.9	-	3.3	1.3
MECHANICAL MODS. & REPAIR	36	0.0	-	-	-	0.4	-	0.0	-	-	0.3	-	-	-	0.0
COMPRESSOR/TURBINE/ENGINE	16	0.0	-	10.1	1.1	0.2	-	2.0	0.6	-	17.3	-	-	-	2.0
METAL REPAIR															
CYLINDER & PISTON	27	-	-	2.3	0.4	0.0	-	0.5	0.9	-	4.4	-	-	-	0.5
PROTOTYPE	35	0.0	-	0.0	0.0	0.1	0.6	0.0	-	-	-	-	0.1	-	0.0
FIELD SERVICE	29	0.0	-	0.0	0.2	2.5	0.4	0.3	-	-	-	0.9	-	0.7	0.3
HELO. DYNAMIC COMPONENTS	10	0.6	-	-	6.1	0.2	-	2.6	-	-	-	-	-	14.7	2.6
TOTAL	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

3. Sheet Metal
4. Testing
5. Machining
6. Hydraulic/Pneumatic
7. Strip/Finish/Paint

For each of the "top seven" direct labor cost drivers, the percentage of cost at each NAVAIREWORKFAC was identified as given in Figure 4. These "top seven" cost drivers aggregate 72% of the total direct labor costs for all facilities with a range of 65%-75% of the direct labor costs at any one facility.

As given in Figure 2, the "top seven" direct material cost drivers were:

1. Electrical/Electronic
2. Disassemble/Assemble
3. Hydraulic/Pneumatic
4. Machining
5. Sheet Metal
6. Helicopter Dynamic Components
7. Compressor/Turbine/Engine Metal Repair

For each of the "top seven" direct material cost drivers, the percentage of cost at each NAVAIREWORKFAC was identified as given in Figure 5. These "top seven" cost drivers aggregate 63% of the total direct material costs for all facilities with a range of 50%-78% of the direct material costs at any one facility. The direct material costs are biased somewhat by extraordinarily expensive material demands

FIGURE 4
"TOP SEVEN" DIRECT LABOR COST DRIVERS
(PERCENT)

[illegible]

**"TOP SEVEN" DIRECT MATERIAL COST DRIVERS
(PERCENT)**

[illegible]

at two of the facilities. NAVAIREWORKFAC Pensacola, the primary helicopter rework facility, realizes large material costs for helicopter dynamic components. It should be noted that NAVAIREWORKFAC Pensacola does not have an engine rework program. NAVAIREWORKFAC Jacksonville has a very substantial engine rework program, which accounts for the large material costs associated with compressor, turbine and engine metal repair.

For each of the combined "top seven" direct labor and direct material cost drivers, the percentage of cost at each NAVAIREWORKFAC was identified as given in Figure 6. These "top seven" cost drivers aggregate 66% of the total direct labor and direct material costs for all facilities with a range of 53%-72% of the combined costs at any one facility. It should be noted that the first six of the cost drivers are the same as was the case for the direct labor cost drivers, although the order has been slightly rearranged. The seventh cost driver is different, however. The appearance of "Misc. - Armament" as the #7 cost driver is due primarily to the high material costs at NAVAIREWORKFAC Norfolk for the missile rework program.

The percentage of cost at each NAVAIREWORKFAC contributed to the total cost as given in Figure 7. Likewise, the percentage of cost for each rework program to the total cost is given in Figure 8.

FIGURE 6
"TOP SEVEN" DIRECT LABOR & DIRECT MATERIAL COST DRIVERS
(PERCENT)

[illegible]

FIGURE 7

DIRECT COSTS BY NAVAIREWORKFAC (PERCENT) (7/1/77 — 12/31/77)

	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
DIRECT LABOR	18.0	10.4	9.4	21.4	23.9	16.9	100.0
DIRECT MATERIAL	11.2	14.0	13.9	14.9	27.2	18.7	100.0
DIRECT LABOR AND DIRECT MATERIAL	14.7	12.2	11.6	18.2	25.6	17.8	100.0

FIG. 8
DIRECT COSTS BY PROGRAM
(PERCENT)
(7/1/77 — 12/31/77)

	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL
DIRECT LABOR	44.9	1.5	9.4	29.6	10.5	4.2	100.0
DIRECT MATERIAL	16.5	1.5	21.8	50.3	5.6	4.2	100.0
DIRECT LABOR AND DIRECT MATERIAL	30.9	1.5	15.5	39.8	8.1	4.2	100.0

Of the two types of costs, labor and material, the management of the NAVAIREWORKFACs usually has a greater opportunity to control labor costs than to control material costs. The material requirements for each rework program are normally dictated by the amount of rework required as determined by technical considerations, material conditions or elapsed time since manufacture or rework of the item. It is acknowledged that the high material cost drivers should be analyzed with the objective of reducing costs through the application of manufacturing technology to their production. However, this phase of acquisition is normally the responsibility of an acquisition manager. It is considered that, in the case of material costs, the acquisition manager should be the primary agent concerned with the application of manufacturing technology by the vendor to reduce material costs and thus increase productivity. NAVAIREWORKFAC management, however, should know which are the direct material high cost drivers and take action regularly to reduce the use of all materials to the lowest level possible while still meeting all product quality requirements. It would be helpful for NAVAIREWORKFAC management to identify high material cost drivers to the acquisition manager so that proper acquisition management action could be taken.

Among the costs incurred in the operation of the naval air rework facilities, direct labor costs apparently are most susceptible to control by NAVAIREWORKFAC management. Through identification of those high cost driver

processes being accomplished within direct labor cost MT functional categories, likely candidates for the application of manufacturing technology by the NAVAIWORKFACs can be determined. For this reason, further cost driver process definition in this study was focused on direct labor cost MT functional categories. This further identification of high cost driver direct labor processes is reported in Section VI of this volume.

SECTION III

MASTER DATA RECORD (MDR) ANALYSIS

General

The master data record (MDR) is the primary working document, other than specific technical directives, which specifies what rework is required and the order in which it must be performed. This document is originated and maintained by the Operations Analysis Division of the Production Engineering Department within each NAVAIREWORKFAC. In recent years, under the aegis of the analytical maintenance program (AMP), the MDRs have been expanded in detail to furnish substantially all of the information to the mechanic and the production support organization which is necessary for the rework of that product. For each operation described, a standard time is cited by the Methods and Standards Division of the Production Engineering Department. MDRs describe both operations which must always be performed (i.e. mandatory) and those which are only performed when circumstances dictate (i.e. optional). They also describe work content for overhaul operations and repair operations. This distinction applies generally within the engine rework program. For this study, selected MDRs produced under the analytical maintenance program were analyzed for the purpose of identifying rework processes in detail for both the aircraft and the engine rework programs.

Aircraft Rework

The type-model-series (TMS) aircraft chosen for analysis in this study covered a broad spectrum of fleet aircraft and depot level maintenance requirements. The A-4M was an example of a very mature type/model aircraft with a well established basic design which has been in the fleet for many years. The F-14A was representative of a very recent addition to the fleet inventory with a somewhat nascent design. The F-4J was representative of a major conversion operation, from F-4J to F-4S, which was sponsored within the service life extension program (SLEP). For each of these aircraft, their respective MDRs covered Standard Depot Level Maintenance (SDLM).

In reviewing the aircraft MDRs, it was necessary to classify the data to facilitate further analysis. One classification was with respect to manufacturing technology sub-functions as listed below:

- Examination; evaluation
- Remove; disassemble; disconnect; scrap
- Install; attach; rework
- Adjust; rig
- Lubricate; service; seal
- Operate; check; test
- Clean; strip; paint
- Correct E&E discrepancies
- Other

The other aircraft MDR classification was with respect to aircraft system. This generally reflected the trades of the artisans performing the rework. The systems chosen, with a brief description of each, were as follows:

- Structures - Refers to wings, fuselage, tail section, control surfaces, canopy.
- Electrical/Electronic - Refers to wiring systems, antennae, aircraft lighting.
- Mechanical - Refers to aircraft control systems, landing gear, arresting gear.
- Hydraulic/Pneumatic - Refers to hydraulic/pneumatic systems.
- Ordnance - Refers to armament, ejection seat pyrotechnics, explosive cord devices.
- Equipment - Refers primarily to "black boxes" installed in aircraft.
- Power plant - Refers to engines, fuel cells, fuel lines.
- Other - Move, tow, clean-up aircraft, log sell operations.

Of the total standard hour effort defined by the A-4M MDR, 58% covered selective disassembly and rework. This was the optional portion of the MDR which was performed when necessary as dictated by the condition of a particular A-4M in standard depot level maintenance rework. It was necessary to determine how much of this optional rework was being

performed normally at NAVAIREWORKFAC Pensacola on A-4M aircraft currently in rework. The current A-4M SDLM norm and the allowance for technical directives were identified. After subtracting the standard hours for the 100% accomplishment tasks (i.e. mandatory rework) as defined in the MDR from the total hours in the norm plus technical directives, the average number of hours allowed for selective disassembly and rework was determined. This optional rework allowance was 40% of the total MDR standard hours identified for selective disassembly and rework. This factor was then applied to each of the selective disassembly and rework sub-function and system totals to obtain an increment which was then added to the appropriate mandatory sub-function and system elements of the total MDR. These numbers were the basis for the division of effort among both the MT sub-functions and the aircraft systems as they are defined above.

A review of the F-14A norm hour breakdown for a recent quarter verified that 33% of the total rework effort was performed by process shops and the time for that (concurrent) rework was not included in the MDR standard time. Thus, the analysis of MT sub-functions and systems for the F-14A was made on that basis. All work specified in the MDR was considered to be mandatory.

Likewise, all work specified in the F-4J MDR was considered to be mandatory. The MDR covered that work which comprised the basic SDLM plus the identification of some conversion work applicable to the F-4J as part of the service

life extension program (SLEP).

The standard hours required to perform the rework involved in both the manufacturing technology sub-functions and also the aircraft systems were converted to percentages of total effort for that TMS aircraft and are given in Figures 9 and 10.

The cost drivers identified by the aircraft MDR analysis were:

- MT Sub-function

<u>A-4M</u>	<u>F-14A</u>
1. Install; attach; rework	1. Install; attach; rework
2. Operate; check; test	2. Operate; check; test
3. Clean; strip; paint	3. Clean; strip; paint
4. Remove; disassemble; disconnect; scrap	4. Remove; disassemble; disconnect; scrap

F-4J

1. Install; attach; rework
2. Remove; disassemble;
disconnect; scrap
3. Operate; check; test
4. Clean; strip; paint

- System

<u>A-4M</u>	<u>F-14A</u>	<u>F-4J</u>
1. Electrical/Electronic	1. Structures	1. Structures
2. Structures	2. Mechanical	2. Electrical/ Electronic
3. Equipment	3. Power plant	3. Mechanical
4. Power plant	4. Equipment	4. Power plant
5. Mechanical	5. Electrical/ Electronic	5. Hydraulic/ Pneumatic

FIGURE 9

**AIRCRAFT REWORK
DIRECT LABOR BY MANUFACTURING TECHNOLOGY SUB-FUNCTION
(PERCENT OF TOTAL STANDARD HOURS)**

AIR-CRAFT	SUB-PROGRAM	MANUFACTURING TECHNOLOGY SUB-FUNCTION								
		EXAM./ EVAL.	REMOVE/ DISASSEM/ DISCONN/ SCRAP	INSTALL/ ATTACH/ REWORK	ADJUST/ RIG	LUB./ SERVICE/ SEAL	OPERATE/ CHECK/ TEST	CLEAN/ STRIP/ PAINT	CORRECT E&E DISCREPS.	OTHER
A-4M	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	0.4	8.5	42.0	1.6	2.8	34.1	10.4	—	0.2
F-14A	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	1.9	8.7	48.3	7.2	2.0	12.7	15.9	3.2	0.2
F-4J	SERVICE LIFE EXTENSION PROGRAM (SLEP)	1.8	10.0	69.6	1.9	0.5	6.9	5.0	3.9	0.2

FIGURE 10
AIRCRAFT REWORK
DIRECT LABOR BY SYSTEM
(PERCENT OF TOTAL STANDARD HOURS)

AIRCRAFT	SUB-PROGRAM	SYSTEM							
		STRU.	ELEC.	MECH.	HYDR/ PNEU.	ORDN.	EQUIP.	POWER PLANT	OTHER
A-4M	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	21.3	43.5	6.6	0.5	0.8	15.7	11.2	0.4
F-14A	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	61.5	6.9	10.8	1.4	2.4	7.0	9.2	0.9
F-4J	SERVICE LIFE EXTENSION PROGRAM (SLEP)	54.2	11.8	9.2	6.9	1.1	5.8	8.3	2.6

NOTES:

STRU. = STRUCTURES
 ELEC. = ELECTRICAL/ELECTRONIC
 MECH. = MECHANICAL
 HYDR/PNEU. = HYDRAULIC/PNEUMATIC
 ORDN. = ORDNANCE
 EQUIP = EQUIPMENT

Engine rework

The largest proportion of the U.S. Navy's engine rework program deals with gas turbine engines. For this study, it was decided to review and analyze the master data records for a turbo-prop engine and a turbo-jet engine. The T56 was chosen as representative of a turbo-prop engine. The J79 and LM1500 represented the turbo-jet engines. In each case, the rework processes were classified by LAGTAB element. LAGTAB is explained in greater detail in Section IV of this volume. The standard hours to perform each operation were identified and normalized to the percentages reported in this volume. The T56 MDR analysis is given in Table 1, and the J79 and LM1500 MDR analysis is given in Table 2.

The cost drivers identified by the engine MDR analysis were:

<u>T56</u>	<u>J79-8B/C/D, J79-10</u>
1. CER and Minor Repair	1. CER and Minor Repair
2. Machines	2. Parts Processing
3. Parts Processing	3. Machines
4. Induction/Disassembly	4. Induction/Disassembly
5. Test	5. Cleaning
<u>J79-10A/B</u>	<u>LM1500</u>
1. Parts Processing	1. CER and Minor Repair
2. CER and Minor Repair	2. Parts Processing
3. Cleaning	3. Cleaning
4. Machines	4. Machines
5. Accessories Processing/ Induction/Disassembly	5. Accessories Processing

TABLE 1
T56 ENGINE MDR ANALYSIS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)
CLASSIFIED BY LAGTAB SEGMENTS

<u>LAGTAB Segment</u>	<u>Description</u>	<u>Percent</u>	
01	Examination and Evaluation		
	Examine	3.1	
	Evaluate	0.0	
	Screen	0.1	
	Sub-Total	<u>3.2</u>	3.2
02	Induct/Disassemble		
	Disassemble	8.4	
	Remove	2.4	
	Sub-Total	<u>10.8</u>	10.8
03	Cleaning		
	Clean/Strip/Abrasive	1.0	
	Surface Preparation	0.2	
	Blast	0.8	
	Bead	0.0	
	Glass Bead	0.1	
	Grit	0.1	
	Seed	0.0	
	Rice Hulls	0.0	
	Sub-Total	<u>2.2</u>	2.2
04	Non-Destructive Testing		
	X-Ray/NDT	2.7	
	Electric Read-Out Machine (EROM)	0.1	
	Sub-Total	<u>2.8</u>	2.8
06	Parts Processing		
	Paint/Bake/Epoxy Resin	2.1	
	Weld	4.1	
	Spray Metal	1.6	
	Spray Plasma	0.6	
	Plate Nickel-Cadmium	0.5	
	Plate Copper	0.2	
	Plate Silver	0.1	
	Plate Nickel-Copper-Silver	0.0	
	Plate Chrome	0.7	
	Aluminum Oxide/Black Oxide	0.1	

	Heat Treat	0.1	
	Mask	0.2	
	Shot Peen	0.2	
	Stress Relieve	0.3	
	Diffuse	0.1	
	Sub-Total	<u>10.9</u>	10.9
07	Machines		
	Braze/Grind/BufF/Mill/Face	8.0	
	Drill and Bore	3.2	
	Ream and Countersink	0.5	
	Machining	9.2	
	Tap Holes	0.1	
	Repair Threads	0.3	
	Chamfer	0.0	
	Manufacture	0.3	
	Hone Bushing	0.2	
	Electrode Oxidation/Elect-		
	ric Discharge Machining		
	(ELOX/EDM)	0.5	
	Sub-Total	<u>22.4</u>	22.4
08	Accessories Processing		
	Recondition	2.1	
	Sub-Total	<u>2.1</u>	2.1
10	Compressor and Turbine		
	Balance	1.5	
	Sub-Total	<u>1.5</u>	1.5
13	CER and Minor Repair		
	Assemble	15.8	
	Check	3.0	
	Inspect	0.5	
	Technical Directives	4.3	
	Overhaul	0.5	
	Service/Flush	0.4	
	Repair	0.4	
	Remove Studs	0.1	
	Remove Threads	0.1	
	Remove Plugs	0.0	
	Remove Bushing	0.1	
	Remove Solder	0.0	
	Install	2.5	
	Install Studs	0.2	
	Install Plugs	0.1	
	Replace	1.3	
	Replace Studs	0.3	

	Replace Threads	0.1	
	Replace Shielding	0.1	
	Replace Bushing	0.2	
	Ream	0.0	
	Safety Wire	0.5	
	Dress Threads	0.2	
	Degrease	0.1	
	Press/Straighten	0.2	
	Route out Cracks	0.0	
	Rework	5.6	
	Resize	<u>0.1</u>	
	Sub-Total	36.8	36.8
14	Test		
	Test	<u>7.2</u>	
	Sub-Total	7.2	7.2
15	Preservation		
	Package	<u>0.1</u>	
	Sub-Total	0.1	0.1
	Grand-Total		100.0

TABLE 2
J79/LM1500 ENGINE MDR ANALYSIS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)
CLASSIFIED BY LAGTAB SEGMENTS

Page 1 of 6

LAGTAB SEGMENT	DESCRIPTION	J79-8B/C/D		J79-10		J79-10A		J79-10B		LM1500	
01	Examination & Evaluation										
	Examine	2.5		2.1		1.8		2.3		1.2	
	Sub-Total	2.5	2.5	2.1	2.1	1.8	1.8	2.3	2.3	1.2	1.2
02	Induct/Disassemble										
	Deblade	0.2		0.2		---		---		0.2	
	Disassembly	5.3		6.0		3.3		2.6		1.5	
	Identify	0.3		0.4		0.6		0.4		0.4	
	Remove	1.6		1.7		1.9		2.3		2.0	
	Separate	0.0		0.0		0.0		0.0		0.0	
	Sort	0.4		0.5		---		---		0.5	
	Un-can	0.1		0.1		---		---		0.1	
	Sub-Total	7.9	7.9	9.0	9.0	5.8	5.8	5.3	5.3	4.9	4.9
03	Cleaning										
	Abrasive Blast	0.1		---		0.1		---		0.1	
	Aluminum Oxide Blast	0.4		0.4		0.8		0.7		0.5	
	Garnet Blast	1.8		1.9		2.7		2.6		2.5	
	Glass Bead Blast	0.1		0.1		0.1		0.1		0.1	
	Sand Blast	0.3		0.3		0.4		0.4		0.2	
	Soft Grit Blast	0.8		0.8		1.4		1.1		0.9	
	Clean	2.5		1.3		2.6		1.2		1.0	
	Steam Clean	0.0		0.0		0.0		0.0		0.0	
	Ultrasonic Clean	0.1		0.1		0.1		0.1		0.1	
	Acid Passivate	0.0		---		0.0		---		---	
	Buff	0.0		0.0		0.0		0.0		0.0	
	Rust Remover	0.1		0.1		0.1		0.1		0.1	
	Scale Conditioner	0.0		0.0		0.1		0.0		0.0	
	Vapor Degrease	0.0		2.1		3.2		2.2		2.1	
	Wash	0.1		0.1		2.3		4.7		4.3	
	Sub-Total	6.2	6.2	7.2	7.2	14.0	14.0	13.4	13.4	11.9	11.9

TABLE 2
J79/LM1500 ENGINE MDR ANALYSIS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)
CLASSIFIED BY LAGTAB SEGMENTS

Page 2 of 6

LAGTAB SEGMENT	DESCRIPTION	J79-8B/C/D		J79-10		J79-10A		J79-10B		LM1500	
04	Non-Destructive Testing										
	Magnetic Particle	0.4		0.4		0.5		0.4		0.4	
	Zyglo/Fluorescent Penetrant	1.3		1.5		1.6		1.7		1.5	
	Sub-Total	1.6	1.6	1.9	1.9	2.1	2.1	2.1	2.1	1.9	1.9
05	Examine & Route										
	Examine & Route	1.2		1.3		2.0		1.5		1.3	
	Route	0.0		0.1		---		---		0.1	
	Sub-Total	1.3	1.3	1.3	1.3	2.0	2.0	1.5	1.5	1.4	1.4
06	Parts Processing										
	Bake/Bake to Dry	0.2		0.0		0.0		---		0.3	
	Cold Work	---		0.0		---		---		---	
	Cure	0.1		0.1		0.1		0.1		0.1	
	Form	0.1		---		---		---		---	
	Heat/Bend/Repair	7.7		8.1		8.6		7.3		6.6	
	Heat Treat/Temper	0.2		0.2		0.2		0.2		0.2	
	Shot Peen	1.0		1.2		1.7		1.6		1.2	
	Stress Relieve/Strain Relieve	0.2		0.2		0.3		0.2		0.2	
	Braze	0.1		0.2		0.0		---		0.0	
	Solder	0.2		0.1		0.3		0.2		0.2	
	Weld	4.1		4.4		2.3		4.7		4.3	
	Electroclean	0.1		0.2		0.2		0.2		0.2	
	Black Oxide	1.1		1.2		2.1		1.7		1.5	
	Chromate/Chromate Conversion	0.5		0.5		0.8		0.5		0.5	
	Magnesium Dichromate	0.0		0.0		---		---		0.0	
	Cermet/Cermet Coating	1.4		1.6		2.7		2.5		1.9	
	Electrostrip Chromium	0.1		0.1		0.1		0.1		0.1	
	Silver Strip	0.2		0.2		0.3		0.3		0.2	
	Strip Nickel/Nickel-Cadmium	0.1		0.1		0.2		0.1		0.1	
	Strip Cadmium Plate	0.1		0.1		0.2		0.1		0.1	

TABLE 2
J79/LM1500 ENGINE MDR ANALYSIS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)
CLASSIFIED BY LAGTAB SEGMENTS

Page 3 of 6

LAGTAB SEGMENT / DESCRIPTION	J79-8B/C/D	J79-10	J79-10A	J79-10B	LM1500
06 Parts Processing (cont.)					
Strip	0.0	0.0	0.0	0.0	0.0
Strip Lead	0.0	0.0	0.1	0.0	0.0
Metal Spray	0.2	0.1	0.1	0.1	0.2
Plazma Spray	0.4	0.4	0.7	0.6	0.5
Plazma Spray - Tungsten Carbide	0.1	0.1	0.1	0.1	0.1
Plazma Spray - Molybdenum	---	0.0	---	0.1	---
Moly Coat	---	0.0	---	---	---
Plate	---	---	---	---	0.0
Chrome Plate/Hard Chrome Plate	1.0	0.8	1.4	1.1	1.4
Electroplate Nickel	2.6	2.9	3.6	3.0	2.4
Silver Plate	0.3	0.4	0.7	0.6	0.5
Selective Electro-Deposition	0.9	1.3	1.6	1.4	1.2
Cadmium Plate	---	0.0	---	---	---
Diffused Nickel-Cadmium Plate	0.1	0.2	0.3	0.2	0.2
Tin-Cadmium Plate	0.0	0.0	0.0	0.0	0.0
CODEP	0.4	0.5	0.4	0.8	0.5
Laquer, Glossy	0.0	---	---	---	---
Polyurethane	0.0	0.0	0.0	0.0	0.0
Silicone Resin Paint	0.5	0.4	0.7	0.6	0.6
Special Coating	0.0	0.0	0.0	0.0	0.0
Sub-Total	23.9 23.9	25.5 25.5	30.1 30.1	28.6 28.6	25.4
07 Machines					
Bore	0.1	0.1	0.3	0.2	0.2
Contour	0.0	---	0.1	---	---
Cut	0.1	0.2	0.2	0.1	0.1
Drill	3.0	1.2	1.0	0.7	0.9
Face/Drill/Tap	---	---	---	0.4	---
Grind	4.2	3.8	4.0	3.6	4.4
Groove	0.0	---	---	---	---
Hone	0.0	---	---	---	---

TABLE 2
J79/LM1500 ENGINE MDR ANALYSIS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)
CLASSIFIED BY LAGTAB SEGMENTS

Page 4 of 6

LAGTAB SEGMENT / DESCRIPTION	J79-8B/C/D		J79-10		J79-10A		J79-10B		LM1500	
07 Machines (cont.)										
Lap	0.8		0.8		1.0		0.9		0.7	
Machining	3.0		2.9		0.3		3.1		1.8	
Mill	0.1		0.1		0.1		0.1		0.1	
Ream	0.3		0.3		0.5		0.4		0.3	
Reface	0.3		0.3		0.1		0.2		0.2	
Slot	0.1		---		---		---		---	
Tap	0.0		0.0		0.0		0.0		0.0	
Turn	0.0		0.1		0.1		0.1		0.1	
Sub-Total	12.1	12.1	9.6	9.6	7.7	7.7	9.9	9.9	8.7	8.7
08 Accessories Processing										
Process	0.2		0.2		0.3		0.2		0.2	
Recondition	5.7		6.7		4.3		5.1		6.9	
Sub-Total	5.8	5.8	6.9	6.9	4.6	4.6	5.4	5.4	7.1	7.1
10 Compressor and Turbine										
Balance	0.7		0.8		0.0		---		1.0	
Sub-Total	0.7	0.7	0.8	0.8	0.0	0.0	---	---	1.0	1.0
13 CER & Minor Repair										
Adjust	0.1		0.1		0.0		---		---	
Assembly	12.1		10.1		7.2		6.8		12.4	
Blend	1.1		1.3		1.5		2.0		1.3	
Build-Up	0.2		0.5		---		---		0.3	
Bush	0.0		0.1		0.0		0.1		---	
Chase Threads	0.1		0.0		0.1		0.1		0.1	
Check	1.3		1.4		0.6		0.4		3.0	
Cold Stack-up	1.6		1.8		---		---		2.2	
Dress	0.5		0.6		0.0		---		0.7	
Fill	0.0		0.0		---		---		---	

TABLE 2
J79/LM1500 ENGINE MDR ANALYSIS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)
CLASSIFIED BY LAGTAB SEGMENTS

Page 5 of 6

LAGTAB SEGMENT	DESCRIPTION	J79-8B/C/D	J79-10	J79-10A	J79-10B	LM1500
13	CER & Minor Repair (cont.)					
	Fit	0.4	0.3	0.4	0.7	0.5
	Flush	0.6	0.7	0.9	0.8	0.6
	Hoist	0.1	0.1	0.1	0.1	0.1
	Incorporate Change/Modify	0.8	0.8	0.8	0.6	0.5
	Inspect	0.0	0.0	0.0	0.0	0.0
	Install	1.7	1.7	2.3	2.3	1.5
	Lubricate	0.0	0.0	0.0	0.0	0.0
	Mate	0.1	0.1	0.1	0.1	0.1
	Measure	0.1	0.1	---	---	---
	Mesh	0.0	---	0.0	---	---
	Overhaul	0.0	---	---	---	---
	Produce	1.6	1.9	3.0	2.5	2.3
	Purge	0.4	0.4	0.7	0.5	0.4
	Rebush	0.1	0.1	0.2	0.2	0.2
	Reform	0.0	0.0	---	---	---
	Repair	7.7	8.1	8.6	7.3	6.6
	Replace	0.8	1.0	1.5	1.4	1.0
	Resize	0.2	0.3	0.4	0.4	0.3
	Retap	---	---	---	0.4	---
	Rework	0.8	0.8	0.0	0.0	0.0
	Safety Wire	0.4	0.3	0.1	0.2	0.1
	Stake	0.0	---	---	---	---
	Straighten	0.1	0.1	0.2	0.2	0.1
	Torque	0.0	0.0	0.0	0.0	0.0
	Un-Dress	0.2	0.3	---	---	0.3
	Sub-Total	33.2	33.0	29.0	27.1	34.4
14	Test					
	Pressure Test	0.2	0.3	0.4	0.3	0.3
	Retest	---	0.4	---	---	---
	Rotab	0.1	---	---	---	0.0

TABLE 2
J79/LM1500 ENGINE MDR ANALYSIS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)
CLASSIFIED BY LAGTAB SEGMENTS

Page 6 of 6

LAGTAB SEGMENT	DESCRIPTION	J79-8B/C/D	J79-10	J79-10A	J79-10B	LM1500
14	Test (cont.)					
	Test	4.2	1.8	2.5	4.3	1.6
	Trim	0.0	---	---	---	0.1
	Sub-Total	4.6 4.6	2.5 2.5	2.9 2.9	4.6 4.6	1.9 1.9
15	Preservation					
	Preserve	0.0	0.0	0.0	0.0	0.0
	Can	0.2	0.2	---	---	0.2
	Sub-Total	0.2 0.2	0.2 0.2	0.0 0.0	0.0 0.0	0.3 0.3
	Grand Total	100.0	100.0	100.0	100.0	100.0

SECTION IV

LAGTAB SEGMENT ANALYSIS

General

For approximately 10 years, the LAGTAB system has been in use at the East Coast NAVAIREWORKFACS. LAGTAB is an acronym for Local Analysis Grouped and Tabulated for Apportionment of Budgets. LAGTAB is a data collecting and reporting system relating the facility organizational structure to identify the type of work performed. In a sense, the LAGTAB system was a forerunner of the cost driver approach to improving productivity through the application of manufacturing technology. The LAGTAB system focuses primarily on:

- Showing expended cost trends
- Identifying modification costs for specific technical directives
- Providing a basis for negotiation of workload standards for major workload programs.

The LAGTAB system classifies the work to be done into various segments.

Aircraft rework

Work performed for the aircraft rework program is classified by assignment of each performing shop to that LAGTAB element which describes the largest portion of that shop's work. The aircraft LAGTAB segments were as follows:

- 01 Examination & Evaluation - Service Groups
- 02 Disassembly
- 03 Strip; clean; corrosion treat
- 04 Fuselage, Metal Repairs
- 05 Assembly
- 06 Prime & Paint
- 07 Ground Check & Flight Test
- 08 Components, Electronics A
- 09 Components, Mechanical B
- 10 Components, Metal C
- 11 Components, Engines D
- 12 Components, Instruments E
- 13 Technical Data

Table 3 is the listing of shops by aircraft LAGTAB segment at NAVAIREWORKFAC Jacksonville. A review of this listing will show that there is a similarity though not an exact correlation, with the listing chosen for the basic cost driver study. LAGTAB, nonetheless, is a reporting system which has been in existence for a number of years and did provide a ready data base for use in making comparisons by this study.

The rework classified by LAGTAB segments has been converted to percentages of TMS aircraft total and is given in Figure 11. Work performed under Depot Level Maintenance (DLM), Standard Depot Level Maintenance (SDLM), and Mid-Term has been covered. It should be noted that Mid-Term maintenance covers that work performed at an interim time between SDLM availabilities. Mid-Term maintenance primarily involves

TABLE 3AIRCRAFT LAGTAB SEGMENTSNAVAIREWORKFAC JACKSONVILLE

	<u>Description</u>	<u>Shop No.</u>	<u>Shop Title</u>
01	E & E-Service Groups	(none given)	
02	Disassembly	(none given)	
03	Strip, Clean, Corr. Treat	93112	A/C Stripping & Corrosion
04	Fuselage, Metal Repairs	95111	Sheet Metal-Rework
		95112	Sheet Metal-Rework
		95221	Sheet Metal-Mod. & Repair
		95611	Sheet Metal-Rework
		95612	Sheet Metal-Rework
05	Assembly	95141	Eng, Fuel, Oil & Hydraulics
		95142	Eng, Fuel, Oil & Hydraulics
		95144	Flt Controls & Fixed Equipment
		95145	Flt Controls & Fixed Equipment
		95171	Electrical Installation
		95172	Electrical Installation
		95175	Electrical Installation
		95222	Elec/Electronic Mod. & Repair
		95223	Mechanical Mod. & Repair
		95641	Eng. Fuel, Oil & Hydraulics
		95642	Eng, Fuel, Oil & Hydraulics
		95643	Flt. Controls & Fixed Equipment
		95644	Flt. Controls & Fixed Equipment
		95671	Electrical Installation
		95672	Electrical Installation

		95675	Electronic Installation
06	Prime and Paint	93116	A/C Finish
07	Ground Ck & Flight Test	95245 95246	Ground & Flight Check Ground & Flight Check
08	Components, Electronics A	94241 94242 94243 94244 94461 94462 94463 94464	Integrated Electronics Electronics Radar Countermeasures Cal. Lab-Osc., Meters Etc. Cal. Lab-Sig. Genrs, IFF, Etc. Electro-Mechanical Support Equip. Industrial Instruments
09	Components, Mechanical B	93111 93112 93113 93115 93116 93151 93152 93154 93155 93156 93211 93212 93215 93216 93217 93218 93221 93222 93223 93224 93225	Component Strip & Clean A/C Stripping & Corro- sion Metal Treating Component Finish A/C Finish A/C Preservation Engine Preservation Packaging Fabric Rubber Flight Controls & Subassemblies Landing Gear Ejection Seat Ejection Seat Pan Oxygen Carbon Dioxide & Nitrogen Hydraulic-Pumps Hydraulic-Valves Propeller Control Cables Constant Speed Drive

		93226	Bearing
		93227	A/C GSE
		93228	Voyage Repair Team
10	Components, Metal C		
		93321	Layout & Sheet Metal
		93322	Tube & Hose Mfg.
		93323	Welding
		93324	Heat Treat
		93325	Pattern, Forge & Foundry
		93327	Cabin Encl. & Plastics
		93331	Sheet Metal - Large Sur- faces
		93332	Sheet Metal - Small Sur- faces
		93333	Sheet Metal - Cowling & Small Parts
		93334	Sheet Metal - A-7 Apr. Repair
		93335	Sheet Metal - Tank & Heat Exch.
		96411	Lathes
		96412	Mills
		96413	Drills
		96414	Grinders
		96415	Tool Manufacturing
11	Components, Engines D		
		96101	R-1820 Engine Repair/ Overhaul
		96102	J-52 Engine Repair/ Overhaul
		96103	TF-41 Engine Repair
		96104	Other Engine Repair
		96105	Engine Test
		96106	Engine Preservation
		96107	Comp/Turbine & Engine Metal Repair
		96108	Engine Disassembly
		96223	Cleaning
		96224	Welding
		96225	Plating/Plasma
		96226	Paint
		96232	Non-Destruct Exam- Engines/Aircraft
		96233	Non-Destruct Exam-Engines
		96234	Non-Destruct Exam-Aircraft
		96235	Cylinder & Piston
		96351	Carburetors
		96352	Hyd. Gear Box, Bearing & Fuel Control
		96353	Fuel Controls Disassy, Clean & Preservation

12	Components, Instruments E	94111	Navigation & Flight Control
		94112	Class 100 Clean Rooms
		94113	Electro-Mechanical Instruments
		94114	Gyros & Controls
		94115	Air Data & Electronic Instruments
		94116	Stable Platform & Camera Mounts
		94117	Fire Control Equipment
		94118	Cameras & Optical
		94119	Graphic Arts
		94121	Seal
13	Technical Data	(none given)	

FIGURE 11

AIRCRAFT LAGTAB SEGMENTS
(PERCENT)

LAGTAB SEGMENT/ DESCRIPTION	SUB-PROGRAM AIRCRAFT	DLM/SDLM				MID-TERM	
		A-7B	A-7E	P-3A	P-3C	A-7A/B	A-7C/E
01 EXAM & EVAL		5.7	6.5	7.1	8.7	8.2	7.0
02 DISASSEMBLY		—	—	—	—	—	—
03 STRIP/CLEAN/ CORR, TREAT		4.1	5.0	5.6	7.7	14.1	22.7
04 FUSELAGE & METAL REPAIRS		12.5	13.7	29.6	20.2	5.2	4.7
05 ASSEMBLY		36.0	33.4	20.0	21.1	20.0	22.6
06 PRIME & PAINT		5.6	6.1	8.7	10.9	23.7	24.5
07 GROUND CK & FLIGHT TEST		8.6	7.5	7.4	9.3	16.9	5.9
08 COMPONENTS, ELECTRONICS A		4.4	4.6	1.5	3.2	4.2	2.2
09 COMPONENTS, MECHANICAL B		9.9	9.7	10.3	9.3	7.3	8.1
10 COMPONENTS, METAL C		9.5	8.6	6.4	8.0	0.2	1.1
11 COMPONENTS, ENGINES D		1.2	1.8	3.1	1.1	0.1	0.4
12 COMPONENTS, INSTRUMENTS E		2.3	3.1	0.3	0.5	0.1	0.8
13 TECH DATA		—	—	—	—	—	—

corrosion control and incorporation of specific changes. It is a much shorter period of depot availability than that required for SDLM. Under these premises, the "cost drivers" by aircraft LAGTAB segment were:

- DLM/SDLM

- A-7

- 1. Assembly
 - 2. Fuselage & Metal Repairs
 - 3. Components, Mechanical B
 - 4. Components, Metal C
 - 5. Ground Check & Flight Test

- P-3

- 1. Fuselage & Metal Repairs
 - 2. Assembly
 - 3. Components, Mechanical B
 - 4. Prime & Paint
 - 5. Ground Check & Flight Test

- Mid-Term

- A-7

- 1. Prime & Paint
 - 2. Assembly
 - 3. Strip/Clean/Corrosion Treat
 - 4. Ground Check & Flight Test
 - 5. Components, Mechanical B

Engine rework

Work performed for the engine rework program is classified by assignment of each performing shop to that LAGTAB element which describes the largest portion of that

shop's work. Engine LAGTAB segments are tailored to recognize the type-model-series (TMS) of engines reworked at that particular NAVAIREWORKFAC. For this study, the engine data of NAVAIREWORKFAC Jacksonville were analyzed. The engine LAGTAB segments at NAVAIREWORKFAC Jacksonville were as follows:

- 01 Examination and Evaluation
- 02 Induction, Disassembly
- 03 Cleaning
- 04 Non-Destructive Testing
- 05 Examination & Routing
- 06 Parts Processing
- 07 Machines
- 08 Accessories Processing
- 09 Cylinder and Piston
- 10 Compressor and Turbine
- 11 R1820
- 12 J52
- 13 CER and Minor Repair
- 14 Test
- 15 Preservation
- 16 Process and Manufacturing Division
- 17 Avionics Division
- 18 Weapons Division

Table 4 is the listing of shops by engine LAGTAB segment at NAVAIREWORKFAC Jacksonville. It should be noted that only performing shops are listed. Other LAGTAB segments at the section, branch or division organization level are not listed.

TABLE 4
ENGINE LAGTAB SEGMENTS
NAVAIREWORKFAC JACKSONVILLE

	<u>Description</u>	<u>Shop No.</u>	<u>Shop Title</u>
02	Induction, Dis- assembly	96108	Engine Disassembly
03	Cleaning	96223	Cleaning
04	Non-Destructive Testing	96232	Non-Destruct Exam- Engines/Aircraft
		96233	Non-Destruct Exam- Engines
		96234	Non-Destruct Exam- Aircraft
06	Parts Processing	96224	Welding
		96225	Plating/Plasma
		96226	Paint
07	Machines	96411	Lathes
		96412	Mills
		96413	Drills
		96414	Grinders
		96415	Tool Mfg.
08	Accessories Processing	96351	Carburetors
		96352	Hyd. Gear Box, Bearing & Fuel Control
		96353	Fuel Controls
		96356	Fuel Controls Disassem, Clean & Preservation
09	Cylinder & Piston	96235	Cylinder & Piston
10	Compressor & Turbine	96107	Comp/Turbine & Eng. Metal Repair
11	R1820	96101	R-1820 Engine Repair/Over- haul
12	J-52	96102	J-52 Engine Repair/ Overhaul
13	CER & Minor Repair	96103	TF-41 Engine Repair
		96104	Other Engine Repair

- | | | | |
|----|--------------|-------|---------------------|
| 14 | Test | 96105 | Engine Test |
| 15 | Preservation | 96106 | Engine Preservation |
- (N.B. Other segments at Section, Branch or Division level)

The same general degree of correlation between the basic MT study cost driver segments and the LAGTAB segments exists among the engine segments as was noted for the aircraft segments.

The engine rework classified by LAGTAB segments has been converted to percentages and is given in Figure 12. The two depths of rework noted are overhaul and supply repair. Overhaul rework is the more comprehensive, and requires a larger investment of labor and material than does supply repair type of rework. For purposes of comparison, the overhaul rework identified in the T56 and J79/LM1500 MDR analysis has been grouped as much as possible to conform with the J52, R1820, TF34 and TF41 engine LAGTAB segments already established. Under these premises, the highest cost engine LAGTAB segments were:

- Overhaul

- J52

- 1. Machines
 - 2. Process and Manufacturing Division
 - 3. Accessories Processing
 - 4. Parts Processing
 - 5. Compressor and Turbine

- R1820

- 1. Machines
 - 2. Parts Processing
 - 3. Cylinder and Piston
 - 4. R1820
 - 5. Process and Manufacturing Division

FIGURE 12
ENGINE LAGTAB SEGMENTS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)

SUB-PROGRAM		OVERHAUL							(SUPPLY) REPAIR				
LAGTAB SEGMENT/ DESCRIPTION	ENGINE	J52	R1820	T56	J79- 8B/C/D	J79- 10	J79- 10A	J79- 10B	LM1500	J52	R1820	TF 34	TF 41
01 EXAMINATION & EVALUATION		3.5	2.8	3.2	2.5	2.1	1.8	2.3	1.2	4.4	3.3	8.4	8.2
02 INDUCTION & DISASSEMBLY		5.9	4.3	10.8	7.9	9.0	5.8	5.3	4.9	2.6	1.3		
03 CLEANING		6.3	6.0	2.2	6.2	7.2	14.0	13.4	11.9	3.8	3.0	1.4	1.8
04 NON-DESTRUCTIVE TESTING		5.3	3.4	2.8	1.6	1.9	2.1	2.1	1.9	3.1	2.3	3.5	1.1
05 EXAMINE & ROUTE					1.3	1.3	2.0	1.5	1.4				
06 PARTS PROCESSING		10.8	15.5	10.9	23.9	25.5	30.1	28.6	25.4	7.0	10.3		2.4
07 MACHINES		16.3	23.0	22.4	12.1	9.6	7.7	9.9	8.7	12.7	8.9	3.0	5.0
08 ACCESSORIES PROCESSING		14.6	5.4	2.1	5.8	6.9	4.6	5.4	7.1	11.1	10.2	0.1	2.8
09 CYLINDER & PISTON			12.1								15.4		
10 COMPRESSOR & TURBINE		9.9	5.4	1.5	0.7	0.8	0.0		1.0	11.5	0.9	3.3	13.9
11 R1820			9.8								31.1		
12 J52		7.7								25.2			
13 CER & MINOR REPAIR				36.8	33.2	33.0	29.0	27.1	34.4			57.9	47.7
14 TEST		5.0	3.6	7.2	4.6	2.5	2.9	4.6	1.9	8.2	5.2	9.8	11.1
15 PRESERVATION		0.9	1.5	0.1	0.2	0.2	0.0	0.0	0.3	1.4	4.2	6.2	2.1
16 PROCESS & MFG DIVISION		13.7	7.3							9.0	3.9	6.5	3.9
17 AVIONICS DIVISION													
18 WEAPONS DIVISION													
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

DATA SOURCE:

- NAVAIREWKFAC JACKSONVILLE ENGINE STATUS REPORT: J52; R1820; TF 34; TF 41
- MASTER DATA RECORD (MDR): T56; J79; LM1500

T56

1. CER and Minor Repair
2. Machines
3. Parts Processing
4. Induction/Disassembly
5. Test

J79-8B/C/D

J79-10

1. CER and Minor Repair
2. Parts Processing
3. Machines
4. Induction/Disassembly
5. Cleaning

J79-10A/B

1. Parts Processing
2. CER and Minor Repair
3. Cleaning
4. Machines
5. Accessories Processing/
Induction/Disassembly

LM1500

1. CER and Minor Repair
2. Parts Processing
3. Cleaning
4. Machines
5. Accessories Processing

• Supply Repair

J52

1. J52

2. Machines
3. Compressor and Turbine
4. Accessories Processing
5. Process and Manufacturing Division

R1820

1. R1820
2. Cylinder and Piston
3. Parts Processing
4. Accessories Processing
5. Machines

TF34

1. CER and Minor Repair
2. Test
3. Examination and Evaluation
4. Process and Manufacturing Division
5. Preservation

TF41

1. CER and Minor Repair
2. Compressor and Turbine
3. Test
4. Examination and Evaluation
5. Machines

SECTION V

MACHINE TOOL UTILIZATION ANALYSIS

General

Though not the largest cost driver in NAVAIREWORKFAC operations, the use of machine tools is certainly a significant cost driver. Very detailed records are kept on numerical control machine utilization. Not as complete records are kept on conventional machine utilization. However, through use of a unique report which is made at NAVAIREWORKFAC Jacksonville, it was possible to determine the relative usage of conventional and numerical control machines.

Numerical Control Machine Utilization

The utilization of each numerical control (N/C) machine at each NAVAIREWORKFAC is reported upon monthly. This N/C Machine Utilization Report includes both production and non-production time. Production time is the sum of cutting, prove-out, set-up, warm-up and clean-up times. Non-production time is the sum of no work, no operator, no tools, maintenance or other miscellaneous down times. Utilization is defined as the ratio of total production time to total scheduled time.

N/C Machine Utilization Reports were analyzed for the test period of July 1, 1977 to Dec. 31, 1977. The results of these analyses are given in Figure 13, Production Time and Figure 14, Cutting Time. The cost drivers based on either production time or cutting time were as follows:

FIG. 13

**N/C MACHINE USAGE
PRODUCTION TIME
(% OF RESPECTIVE NAVAIREWORKFAC TOTAL)
1 JUL 77 — 31 DEC 77**

MACHINE/ PROCESS	NAVAIREWORKFAC						
	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
LATHES	38.5	15.7	17.0	22.6	16.3	24.7	22.3
DRILLS	10.3	—	4.8	12.1	6.2	12.5	8.3
PUNCHES	2.0	3.9	—	—	3.8	3.8	2.4
MILLS/BORING MILL	36.2	26.4	20.1	5.3	24.8	5.8	18.8
MACHINING CENTERS	10.6	54.0	58.1	59.4	40.8	52.9	45.5
GRINDERS	—	—	—	—	4.0	—	1.1
ROUTERS	2.4	—	—	—	4.2	—	1.5
TUBE BENDERS	—	—	—	0.6	—	0.3	0.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FIG. 14

**N/C MACHINE USAGE
CUTTING TIME
(% OF RESPECTIVE NAVAIREWORKFAC TOTAL)
1 JUL 77 — 31 DEC 77**

MACHINE/ PROCESS	NAVAIREWORKFAC						
	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
LATHES	43.7	16.2	16.3	21.8	12.5	28.1	21.9
DRILLS	8.8	—	0.7	12.4	7.4	13.6	8.2
PUNCHES	2.6	3.1	—	—	3.8	3.7	2.4
MILLS/BORING MILL	33.0	26.8	15.3	5.6	28.8	6.4	19.4
MACHINING CENTERS	9.3	53.9	67.7	60.0	39.4	47.9	45.4
GRINDERS	—	—	—	—	3.1	—	0.9
ROUTERS	2.6	—	—	—	5.0	—	1.8
TUBE BENDERS	—	—	—	0.2	—	0.2	0.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1. Machining center operations
2. Turning
3. Milling
4. Drilling
5. Punching

Significantly greater detail is available in Figures A-31 through A-52 contained in Volume II - Addendum of this report.

Conventional Machine Usage

NAVAIREWORKFAC Jacksonville has consolidated all machine tool operations within a single shop. Machine tools performing similar functions are grouped together in the same geographical area. This geographical area is specified by a code on all pre-printed work orders or operating documents which originate from master data records (MDRs). Both conventional and numerical control machine operation data is sorted at NAVAIREWORKFAC Jacksonville by this geographical area code and is displayed in the geographical area report. This report is made in addition to the N/C machine utilization report. By comparing data from the N/C machine utilization report and the geographical area report, some conclusions regarding the relative uses of N/C and conventional machine tools can be made. The "cutting time" in the N/C machine utilization report is generally comparable to the "expended time" in the geographical area report.

The master data records (MDRs) identify the geographical area code which applies to that machine work

specified on the MDR. Thus, for all work done as directed by an MDR, the machine hours expended are collected in the geographical area report. However, some work is done under a Planning Manufacturing Order (PMO) system which parallels the MDR system. The PMO system, also known as "hand-writes", is directed by the production planners to meet a specific requirement. The shop geographical area code is not usually on the PMO. For this reason, the expended hours on the geographical report will be less than the cutting time on the N/C machine utilization report. To determine how much this understatement of use might be, an equipment utilization study of August 1972 was reviewed. During the four month base period in 1972, 20% of the total machine hours expended, both conventional and numerical control, were done to satisfy PMOs. Assuming that the division of effort in 1977 was comparable to that experienced in 1972, the N/C machine expended hours on the geographical area report were factored by dividing by 0.80 (i.e. $1 - 0.20$). The quotient was comparable to the cutting hours reported for the same period on the N/C machine utilization report. Thus, the applicability of the geographical area report was confirmed. The results of this analysis are given in Figure 15. For NAVAIREWORKFAC Jacksonville, the conventional machine "cost drivers" for the test period were:

1. Grinding
2. Turning

3. Drilling
4. Milling
5. Electrical Discharge Machining

FIGURE 15
MACHINE USAGE
(PERCENT)
NAVAIREWORKFAC JACKSONVILLE
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	CONVENTIONAL	NUMERICAL CONTROL		
	EXPENDED TIME ²	EXPENDED TIME ²	PRODUCTION TIME ¹	CUTTING TIME ¹
LATHES/AUTOMATIC BAR MACHINE	29.2	15.6	17.0	16.3
AUTOMATIC SCREW MACHINES	0.6	—	—	—
DRILLS	9.4	4.5	4.8	0.7
BORERS/BORING MACHINE	0.4	—	—	—
HONES	2.8	—	—	—
GRINDERS	40.6	—	—	—
ELECTRICAL DISCHARGE MACHINES	3.3	—	—	—
ELECTRON BEAM WELDERS	2.3	—	—	—
MILLS/BORING MILL	6.6	14.2	20.1	15.3
MACHINING CENTERS	—	65.7	58.1	67.7
PLANER	—	—	—	—
SHAPERS	—	—	—	—
BROACH	0.1	—	—	—
DEBURRING MACHINE	2.9	—	—	—
LAPPING MACHINE	0.1	—	—	—
HANDWORK	1.8	—	—	—
TOTAL	100.1	100.0	100.0	100.0

¹ N/C MACHINE UTILIZATION REPORT

² GEOGRAPHICAL AREA REPORT

SECTION VI

PRODUCTION SHOPS SURVEY

One of the primary objectives of this manufacturing technology cost drivers study was to identify and quantify the specific processes used in the aircraft rework, overhaul and remanufacture industrial operation. After thoroughly investigating all existing recurring reports, it was determined that none of them contained data to the level of detail desired. To obtain these data, it was necessary to survey the direct labor cost driver shops in the "top seven" MT functional categories as given in Figure 4. The production shops surveyed at each of the NAVAIREWORKFACS are given in Tables 5 through 10, and reflected the shops organization at the end of 1978. As stated earlier, the direct labor cost drivers are generally susceptible to MT improvements at the NAVAIREWORKFAC itself, whereas the direct material cost drivers are generally responsive to improvement efforts initiated by the material acquisition manager. For this reason, direct labor cost drivers were concentrated upon for the production shop survey.

For each of the "top seven" MT functional categories, individual shop survey forms were prepared and distributed to the applicable shops. The first line supervisor for each shop was requested to estimate the time spent on performing each of the elemental operations listed on the form. Additional elemental operations not already listed but being

TABLE 5

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC ALAMEDA

ELECTRICAL/ELECTRONIC

94111	Instrument Pre-Processing
94112	Pressure Flight Instruments
94113	Graphic Arts
94114	Electro-Mechanical Electronics
94121	Indicators & Controls
94122	Navigational Components
94123	Computers & Instruments
94124	Flight Control Components
94131	Flight Gyroscope
94132	Vertical Gyroscope
94133	Gyroscope Platform
94212	Electrical/Electronics Interfacing
94213	Process/Test and Electrical Components
94216	Power Generating/Control Systems
94217	Electro-Mechanical Drive/Conversion Devices
94321	Electronic Warfare
94322	VAST/HATS/SACE Avionics
94323	RADAR
94324	IFF and Navigation
95322	Structural/Electrical Rework

DISASSEMBLE/ASSEMBLE

94224	Missile Induction/Canning
94225	Missile Component Rework
95221	A/C Component Removal (A6)
95232	A/C Mechanical/Electrical Installation & Test (A6)
95241	A/C Component Removal (S3)
95321	A/C Component Removal (P3/C118)
95332	A/C Electrical/Mechanical Installation & Test (P3/C118)
95341	A/C Disassembly (S3)
95342	A/C Disassembly (A3)
96221	Assembly T56)
96223	Assembly (J52)
96224	Gearbox
96225	Assembly (TF34)
96226	Assembly (TF41)
96227	Disassembly, Minor Repair, CER (TF30)
96228	Examination & Route

SHEET METAL

93111	Cowling, Miscellaneous Parts
93112	Tanks
93113	Wings & Stabilizers
93142	Metal Manufacturing
93143	Sub-Assembly Heat Treat
95323	Structural/Electrical/Mechanical Rework
95422	Repair/Modification
96217	Metal

TESTING

94221	SPARROW Guidance Test
94222	SPARROW Control Test
94223	SPARROW Modification/Systems Test
94226	SHRIKE/ BULLPUP Test
94227	PHOENIX Test
94325	ATE and Module Repair
95333	Final Systems Test
95334	Pre-Flight (P3/A3/C118)
96234	Engine Test (J52,J65,T56,TF34,TF41,TF30,J57)

MACHINING

93131	Tool & Die
93132	N/C Machine
93133	Lathe & Auto Machine
93134	Grinder & Drill
93135	Mills
93137	Heavy Metal Fabrication
96311	Lathe
96312	Mill
96313	Drill
96314	Grind

HYDRAULIC/PNEUMATIC

93124	Pumps &CSD & Mechanical Components
93125	Cylinder Valve & Auto Flight Control
96321	Pumps
96322	Engine Controls
96323	Ignition
96324	Fuel System Accessories
96325	Pump & Controls
96326	Regulators
96331	Drive & Test
96332	Turbine
96333	GTC
96336	Disassembly
96337	Valves

STRIP/FINISH/PAINT

93215	A/C Paint West
93216	A/C Paint East
93217	Parts Paint
93221	A/C Stripping

TABLE 6

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC CHERRY POINT

ELECTRICAL/ELECTRONIC

94101	Instruments
94102	Guidance & Stabilization
94105	Electric Battery
94205	Communication, Navigation & Identification
94206	RADAR/Fire Control
95102	A/C Rework Shop
95103	A/C Rework Shop
95104	A/C Rework Shop
95105	A/C Rework Shop
95107	A/C Rework Shop
95201	A/C Rework Shop
95202	A/C Rework Shop
95205	A/C Rework Shop
95207	A/C Rework Shop
95301	A/C Rework Shop
95302	A/C Rework Shop
95304	A/C Rework Shop
95305	A/C Rework Shop
95306	A/C Rework Shop
95402	A/C Rework Shop
95403	A/C Rework Shop
95404	A/C Rework Shop
95405	A/C Rework Shop
95406	A/C Rework Shop
95407	A/C Rework Shop

DISASSEMBLE/ASSEMBLE

94403	Disassembly & Rework
95101	A/C Rework/Preservation & Salvage
95102	A/C Rework Shop
95103	A/C Rework Shop
95105	A/C Rework Shop
95106	A/C Rework Shop
95107	A/C Rework Shop
95201	A/C Rework Shop
95202	A/C Rework Shop
95203	A/C Rework Shop
95205	A/C Rework Shop
95206	A/C Rework Shop
95207	A/C Rework Shop
95301	A/C Rework Shop
95302	A/C Rework Shop
95304	A/C Rework Shop

95305	A/C Rework Shop
95306	A/C Rework Shop
95401	A/C Rework Shop
95402	A/C Rework Shop
95403	A/C Rework Shop.
95404	A/C Rework Shop
95405	A/C Rework Shop
95406	A/C Rework Shop
95407	A/C Rework Shop
96105	Disassembly Reclamation
96107	Parts Repair
96201	Engine Assembly, Repair & Test (T-76)
96202	Engine Assembly, Repair & Test (T-58)
96204	Engine Assembly, Repair & Test (J-79)
96206	Engine Assembly, Repair & Test (F-402 Pegasus)
96301	Fuel/Oil/Hydraulic Accessories Disassembly
96302	Fuel/Oil/Hydraulic Accessories Assembly
96305	Fuel Controls/Fuel Gallery Assembly & Rework
96308	Propellers, Transmissions & Gear Boxes
96309	Rotor & Balancing

SHEET METAL

93201	Tanks, Tubing, Hose & Parts Repair
93202	Survival Equipment
93204	Large & Small Surfaces
93207	Aluminum Manufacture & Repair
93209	Steel Manufacture, Foundry & Heat Treat
93305	Support Equipment
95102	A/C Rework Shop
95104	A/C Rework Shop
95107	A/C Rework Shop
95201	A/C Rework Shop
95202	A/C Rework Shop
95204	A/C Rework Shop
95205	A/C Rework Shop
95206	A/C Rework Shop
95207	A/C Rework Shop
95301	A/C Rework Shop
95302	A/C Rework Shop
95303	A/C Rework Shop
95304	A/C Rework Shop
95305	A/C Rework Shop
95306	A/C Rework Shop
95307	A/C Rework Shop
95402	A/C Rework Shop

95403	A/C Rework Shop
95404	A/C Rework Shop
95405	A/C Rework Shop
95406	A/C Rework Shop
95407	A/C Rework Shop
96107	Parts Repair
96207	Preservation & Packaging

TESTING

94207	Automatic Test Equipment Utilization
94404	Gas Turbines
95210	Ground Check/Flight Test
96201	Engine Assembly, Repair & Test (T-76)
96202	Engine Assembly, Repair & Test (T-58)
96204	Engine Assembly, Repair & Test (J-79)
96206	Engine Assembly, Repair & Test (F-402 Pegasus)
96303	Fuel/Oil/Hydraulic Accessories Test

MACHINING

93301	Machine Manufacture
93302	Machine Rework
94403	Rotary Blade Rework
95101	A/C Rework/Preservation & Salvage
96106	Machine

HYDRAULIC/PNEUMATIC

93303	Hydraulic
94401	Valves, Regulators & Accessories
94402	Starters & Turbines
94403	Disassembly & Rework
94404	Gas Turbines
94406	Air Turbine Motors

STRIP/FINISH/PAINT

93101	A/C Strip & Clean
93104	Components Painting & Cleaning
93107	A/C Paint & Corrosion Control
93401	Rotary Blade Rework
96103	Paint
96207	Preservation & Packaging

TABLE 7

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC JACKSONVILLE

ELECTRICAL/ELECTRONIC

93532	Rotating Electric
93534	Components
94111	Navigation & Flight Control
94112	Class 100 Clean Rooms
94113	Electro-Mechanical Instruments
94114	Gyros & Controls
94115	Air Data & Electr. Instruments
94116	Stable Platform & Camera Mounts
94117	Fire Control Equipment
94118	Cameras & Optical
94121	Seal
94241	Integrated Electronics
94242	Electronics
94243	RADAR
94244	Countermeasures
95171	Electrical Installation
95172	Electrical Installation
95175	Electronic Installation
95222	Electrical/Electronic Modification & Repair
95671	Electrical Installation
95672	Electrical Installation
95675	Electronic Installation

DISASSEMBLE/ASSEMBLE

95141	Engine, Fuel, Oil & Hydraulics
95142	Engine, Fuel, Oil & Hydraulics
95641	Engine, Fuel, Oil & Hydraulics
95642	Engine, Fuel, Oil & Hydraulics
96101	R-1820 Engine Repair/Overhaul
96102	J-52 Engine Repair/Overhaul
96103	TF-41 Engine Repair
96104	Other Engine Repair
96108	Engine Disassembly

SHEET METAL

93321	Layout & Sheet Metal
93322	Tube & Hose Manufacturing
93331	Sheet Metal - Large Surfaces
93332	Sheet Metal - Small Surfaces
93333	Sheet Metal - Cowling & Small Parts

93334	Sheet Metal - A-7 APR Repair
93335	Sheet Metal - Tank & Heat Exchangers
95111	Sheet Metal - Rework
95112	Sheet Metal - Rework
95221	Sheet Metal - Modification & Rework
95611	Sheet Metal - Rework
95612	Sheet Metal - Rework

TESTING

95245	Ground & Flight Check
95246	Ground & Flight Check
96105	Engine Test
96232	Non-Destructive Examination - Engines & Aircraft
96233	Non-Destructive Examination - Engines
96234	Non-Destructive Examination - Aircraft

MACHINING

96411	Lathes
96412	Mills
96413	Drills
96414	Grinders
96415	Tool Manufacturing

HYDRAULIC/PNEUMATIC

93221	Hydraulics - Pumps
93222	Hydraulics - Valves
93225	Constant Speed Drive

STRIP/FINISH/PAINT

93111	Component Strip & Clean
93112	Aircraft Stripping & Corrosion
93115	Component Finish
93116	Aircraft Finish
94119	Graphic Arts
96226	Paint

TABLE 8

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC NORFOLK

ELECTRICAL/ELECTRONIC

93113	Electrical Installations & Prototype
93142	Electrical Launch & Recovery Systems
94121	Inertial Platforms
94122	Gyros
94123	Accelerometers & Missile Seeker Heads
94124	Electrical Instruments, Photo & Optical
94125	Gyros
94126	Automatic Pilots & Mechanical Gyros
94211	RADAR
94212	Navigational Systems
94213	Computer
94214	ASW, EMC & IFF
94215	Support & Avionics Bearings
94221	SACE
94222	Module/CNI
94224	VAST/AWM-23/AWG-9
94226	VAST/AWM-23/AWG-9 Maintenance & Calibration
94311	Rotating & Controls
94313	Subassembly
95212	A/C Rework & Mod-Electrical & Electronic
95222	A/C Rework & Mod-Electrical & Electronic
94224	A/C Rework & Mod-Electrical & Electronic
95323	A/C Rework & Mod-Electrical & Electronic
95324	A/C Rework & Mod-Electrical & Electronic

DISASSEMBLE/ASSEMBLE

95112	A/C Rework & Operational Check
95113	A/C Rework & Operational Check
95211	A/C Rework & Modification - Airframes
95215	A/C Rework & Modification - Airframes
95221	A/C Rework & Modification - Airframes
95225	A/C Rework & Modification - Airframes
95314	A/C Rework & Modification - Airframes
95321	A/C Rework & Modification - Airframes
95322	A/C Rework & Modification - Airframes
96111	TF-30 Repair & Final Assembly
96113	J-57 Subassembly, Repair & Final Assembly
96121	Blade & Nozzle
96122	Rotor Build & TF-30 Subassembly
96125	J-52, T-56 Overhaul & A/B Repair

96131	Engine Disassembly & Buildup
96134	Gearbox Assembly, Cleaning & Closure

SHEET METAL

93111	Large Surface Repair
93112	Subassembly & Operational Check
93114	Cabin Enclosure, Cowling & Fairing Repair
93132	Small Surface Repair
93141	Mechanical Launch & Recovery Systems
93212	Sheet Metal Manufacturing
95213	A/C Rework & Modification - Structural
95223	A/C Rework & Modification - Structural
95311	A/C Rework & Modification - Structural
95312	A/C Rework & Modification - Structural
95313	A/C Rework & Modification - Structural

TESTING

93235	Non-Destructive Testing
94315	Test
95121	Ground Check & Flight Test
96114	Engine Test
96143	Fuel Control Test

MACHINING

93222	Numerically Controlled & Conventional Milling
93223	Numerically Controlled & Conventional Turning & Drilling
93224	Tool & Die Manufacturing
93231	General Machine & Line Support
96212	Lathes, Mills, Grinders & Electrical Dis- charge Machines
96213	Boring Mills & Drills, Toolmaking & Rework
96223	Metal Repair & Metallizing

HYDRAULIC/PNEUMATIC

93133	Hydraulic
93332	Aviation Ordnance & Pneumatic Equipment
96233	Constant Speed Drives, Pumps & Bearings

STRIP/FINISH/PAINT

93321	Primary Paint & Decalcomania Manufacture
93322	Paint (Aircraft)

TABLE 9

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC NORTH ISLAND

ELECTRICAL/ELECTRONIC

94112	Electro-Mechanical
94115	Generators, Starters, GSE
94118	Panels & Subassemblies
94119	Control Equipment
94231	Communication
94232	Tactical Navigation
94233	RADAR, Altimeters and Misc. Systems
94234	Microminiature Manufacture and Repair
94242	Navigational and Misc. Systems
94243	ECM/ASW SONAR, RADAR
94244	E2B/SACE-SSE
94245	E2 Aircraft Tactical Check
94251	Missile Control (RADAR)
94252	Armament and Search Systems
94253	AWG-10/10A
94254	AWG-9
94255	Control Systems
95522	E-2/C-2 Flight Check
95531	Wire/Bundle Installation
95532	Wire/Splice Installation
95622	DITMCO/Installation
95626	Electrical/Electronic Check-out
95714	Electronic and Electrical Installation
95723	Electronic and Electrical Installation

DISASSEMBLE/ASSEMBLE

93421	Parts Repair (Bulk-Partial)
95414	Fuel Cells
95416	Aft Fuselage
95431	Forward Cockpits
95432	Fuel Cells
95433	Center Aft Fuselage
95434	Wings/Misc. Repair
95533	Fuel Installation
95534	BLC and Tail
95535	Wing/Landing Gear Installation/Basic Hyd.
95623	Fixed Equipment/Refrigeration
95624	Rigging/Check-out (Even Seq.)
95625	Rigging/Check-out (Odd Seq.)
95711	Disassembly and Transmission
95714	Electrical/Electronic Installation
95715	Airframes
95721	Disassembly and Installation

95724	Misc. Metal Repair
95725	Final Assembly and Check-out
96311	Disassembly/Nut & Bolt, Shop Process Instruction (Bulk)
96315	Blade Reconditioning (Bulk)
96316	Small Engine Rework (Bulk)
96321	Shaft/Rotor Assembly and Balance (Bulk)
96322	J79/LM1500/LM2500 Subassembly
96323	J79/LM1500/LM2500 & Afterburner Assembly
96324	Minor Repair & QEC Assembly
96411	Disassembly/Exam & Routing (Bulk)

SHEET METAL

93422	Wings & Large Surfaces
93423	Small Surfaces
93424	Metal Tanks and Ducts (Bulk-Partial)
93425	Container Repair, Engine & Afterburner, Rotor Blade, Canning/Uncanning
95412	Cockpits
95413	Compartment 1
95414	Fuel Cells
95415	Center Fuselage
95416	Aft Fuselage
95422	Wings
95423	Strap Installation
95431	Forward Cockpits
95432	Fuel Cells
95433	Center Aft Fuselage
95434	Wings/Misc. Repair
95713	Structures
95722	Fuselage Repair
95724	Misc. Metal Repair
97215	Sheet Metal

TESTING

95416	Aft Fuselage
95431	Forward Cockpits
95432	Fuel Cells
95434	Wings/Misc. Repair
95521	F-4 Flight Check
95522	E-2/C-2 Flight Check
95523	Helo Flight Check
95714	Electrical/Electronic Installation
95724	Misc. Metal Repair
95725	Final Assembly & Check-out
96314	NDT, Exam & Routing (Bulk)
96325	Engine and Gearbox Test
96411	Disassembly/E&R (Bulk)
96414	Fuel Valves - Electrical & Small Acc. Flow Test
96416	Accessories Flow Test

MACHINING

96423	Large Machine (Bulk)
96424	Small Machine
97221	N.C. Machining
97222	Lathes
97227	Grinders & Hones
97228	Drills & Mills
97232	Weapons #2 Support
97234	Weapons #1 Support
97236	Accessories Support
97237	Avionics Support
97238	Tooling Mfg.
97313	Rotor Heads
97315	Transmissions (Bulk)

HYDRAULIC/PNEUMATIC

93211	Constant Speed Drive & Flight Controls (Bulk- Partial)
93214	Hydraulic Pumps
93215	Misc. Hydraulic Units
93216	Components Test
93218	Rescue Hoists
95535	Wing/Landing Gear Installation/Basic Hyd.
97312	Landing Gear

STRIP/FINISH/PAINT

96425	Paint/CODEP (Bulk)
97321	Cleaning (Bulk)
97332	Misc. Painting (Bulk)
97333	Parts Painting (Bulk)
97341	Paint Line A/C - E-2, C-2, Helo/Misc.
97342	Paint Line A/C - F-4 & Misc.
97343	Misc. Corrosion Control & Preparation for Paint

TABLE 10

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC PENSACOLA

ELECTRICAL/ELECTRONIC

94301	Instrument
94302	Instrument
94303	Instrument
94304	Instrument
94305	Instrument & Bearing
94306	Instrument & Decontamination
94307	Instrument
94401	Instrument
94402	Instrument
94403	Instrument
94404	Instrument
94405	Instrument
94406	Instrument
94407	Instrument
94408	Instrument
94501	Electronic Repair
94502	Electronic Repair (UHF Comm)
94503	Electronic Repair (UHF & FM NAV Comm)
94504	Electronic Repair (NAV & Misc.)
94506	Rotating Electrical Equipment
94507	Disassembly & Cleaning
94508	Rotating Electrical Equipment
94701	Electrical
94702	Avionic Cable
95125	Minor Repair
95127	Pavelow III
95143	Battery
95148	Battery
95151	SDLM/Electrical T-2/Misc.
95152	SDLM/Electrical T-28
95221	T-2/T-33/Quick Fix/T-28 (Electrical)
95224	SDLM/A.C.I. (Electronics)
95231	SDLM/H-3 (Electrical)
95452	A-4 (Electrical)
95453	A-4 (Electrical)
95463	A-4 (Electrical)
95472	T-39 (Electrical)

DISASSEMBLE/ASSEMBLE

93309	Wings
95147	QEC
95211	A.C.I. H-3/H-53
95214	SDLM H-53 Electrical
95215	SDLM H-53 Mechanical
95222	T-2/T-33/Quick Fix/T-28 (Mechanical)
95227	T-28 (Mechanical)
95235	SDLM H-3 Mechanical
95454	A-4 (Mechanical)
95465	A-4 (Mechanical)
95473	T-39 (Mechanical)
96407	Disassembly
96508	Cabin Enclosures

SHEET METAL

93302	Large Tanks & Heat Exchangers
93303	Large Surfaces
93304	Cowling
93407	Metal Manufacturing
95121	Minor Repair
95154	T-2/T-33/Quick Fix/T-28 (Metal)
95216	SDLM H-53 Metal
95232	SDLM H-3 Mechanical
95233	SDLM H-3 Mechanical
95234	SDLM H-3 Metal
95451	A-4 (Metal)
95461	A-4 (Metal)
95471	T-39 (Metal)
95475	T-39 (Metal)

TESTING

93405	Nondestructive Testing
95131	A/C Test
95132	A/C Test
95135	A/C Electrical & Electronic
95136	Avionics
95137	Helicopter Test
95243	Helicopter Electrical & Electronics Test

MACHINING

93501	Grinders
93502	Toolmaking
93503	Toolmaking

93504	Machine Support & Springs
93505	Mills
93506	Engine Lathes
93507	General Machining
93508	General Machining (third shift)
96405	Machines

HYDRAULIC/PNEUMATIC

96602	Hydraulics & Test
96603	Hydraulics & Test

STRIP/FINISH/PAINT

93601	Cleaning
93605	Paint
93606	Paint
95141	Paint
95142	Paint
95144	Paint
96504	Paint & Special Coating

performed by the shop were to be added to the form. The number of people assigned to each shop was also noted. With these input data, the equivalent number of people performing any identified MT elemental operation was determined at each NAVAIREWORKFAC and then summed for the total NAVAIREWORKFAC effort. The results of this analysis were converted to percentages and are given in Tables 11 through 17. The highest elemental cost driver operations for each of the manufacturing technology functional categories were:

- Electrical/Electronic
 1. Repair of aircraft wiring and/or equipment.
 2. Repair.
 3. Rework.
 4. Overhaul.
 5. Check or test of operational equipment.
- Disassemble/Assemble
 1. Assemble.
 2. Disassemble to test or check.
 3. Disassemble to route for rework.
 4. Disassemble to rework.
 5. Disassemble to comply with technical directives.
- Sheet Metal
 1. Comply with technical directives.
 2. Manufacture and install structural repair parts.
 3. Remove or treat corrosion.

TABLE 11
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 1 OF 3

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

MANU. TECH OPERATION \ NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
AIRCRAFT EQUIPMENT/WIRING:							
- MODIFY	4.2	17.6	0.5	3.5	11.0	4.8	6.1
- REPAIR	29.0	9.6	2.4	10.3	17.1	11.9	13.8
- REPLACE	1.2	2.6	0.4	0.9	5.8	8.3	3.3
- INSTALL		6.7	0.3	3.6	15.0	4.6	5.4
CHECK/TEST:							
- OPERATIONAL	2.7	11.1	8.7	4.8	10.6	7.7	7.3
- DITMCO <u>1</u> /	1.0	3.5	2.1	1.1	2.4	1.8	1.8
- OTHER AUTOMATIC TEST EQUIPMENT <u>1</u> /	0.4	1.2	4.4	8.6	3.5	0.7	3.7
CORRECT DISCREPANCIES	1.3	2.3	0.1	2.1	0.9	1.1	1.3
EVALUATE	2.4	1.4	5.5	2.1	1.7	0.2	2.2
REPAIR	3.3	7.6	13.2	15.3	4.3	10.0	9.2
REWORK	12.5	10.3	14.5	5.9	2.2	14.7	9.2
OVERHAUL	9.0	4.3	14.2	5.6	1.7	20.9	9.0
CALIBRATE	6.8	0.4	5.9	4.6	0.5	0.2	3.2
CROSS CHECK	0.1	0.3	0.8	0.4	0.3	0.0	0.3
CERTIFY	0.9	0.5	2.0	1.4	1.6	0.4	1.2
TEST	6.2	2.0	5.0	5.1	2.1	2.5	3.9

TABLE 11
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 2 OF 3

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
DISASSEMBLE	4.2	3.7	5.1	4.4	2.6	2.1	3.7
ASSEMBLE	5.4	2.4	8.8	6.4	2.3	2.8	4.8
COMPLY WITH TECHNICAL DIRECTIVES	2.4	2.3	2.7	9.3	6.6	0.6	4.7
HERMETICALLY SEALED INSTRU- MENTS AND COMPONENTS:							
- UNSEALING	0.7	1.4	0.2	0.8	0.2	0.1	0.5
- LEAK-TESTING	0.8	0.6	0.3	0.2	0.2	1.1	0.5
- PURGING	0.2	0.5	0.3	0.3	0.0	0.3	0.2
- FILLING	0.1	0.6	0.2	0.5	0.1	0.1	0.2
- RESEALING	1.1	0.4	0.2				0.2
- FOG-TESTING	0.1		0.1	0.1			0.0
REFINISH:							
- DIALS	0.3		0.0	0.1	0.0	0.0	0.1
- POINTERS	0.2			0.0		0.0	0.0
- PANELS	0.1	1.0	0.1	0.4	0.4	0.1	0.3
- NAME PLATES	2.9	0.6	0.1	0.3	0.1	0.0	0.6
MANUFACTURE:							
- PRINTED CIRCUIT BOARDS						0.1	0.0

TABLE 11
 PRODUCTION SHOPS SURVEY
 (Percent of NAVAIREWORKFAC Total).

PG 3 OF 3

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
REPAIR:							
- PRINTED CIRCUIT BOARDS	0.1				0.0		0.0
- MINIATURE INTEGRATED CIRCUITS		4.2	1.0	0.8	4.4	2.4	2.0
- MICRO-MINIATURE INTEGRATED CIRCUITS		0.7	0.9	0.4	2.2	0.4	0.9
INSTALL CABLING/EQUIPMENT				0.6			0.1
PHOTO PROCESS	0.4						0.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1/ SEE ALSO TABLE 14 - "TESTING"							

TABLE 12
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 1 OF 1

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: DISASSEMBLE/ASSEMBLE

MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
DISASSEMBLE TO:							
- TEST/CHECK	9.1	9.1	15.0	6.1	10.0	14.2	9.9
- ROUTE FOR REWORK	14.2	8.1	12.7	4.2	5.3	7.4	8.4
- ACCESS OTHER PARTS/ AREAS	8.6	2.3	5.4	5.7	2.7	6.1	5.1
- REPAIR	5.2	7.3	6.6	5.5	9.0	7.7	6.9
- REWORK	6.4	7.4	5.6	4.9	6.1	18.9	7.6
- OVERHAUL	1.9	3.3	2.2	7.0	6.0	4.3	4.3
- MODIFY	4.8	11.1	1.4	5.4	5.1	3.7	5.6
- COMPLY WITH TECHNICAL DIRECTIVES	6.2	5.9	5.0	10.3	9.3	5.2	7.4
- TREAT CORROSION	1.1	1.0	0.7	2.6	1.3	2.5	1.5
- BACK-ROB				0.6			0.1
ASSEMBLE	42.5	44.5	45.4	47.1	45.2	30.1	43.1
BALANCING				0.6			0.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 13
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 1 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
PHOTO TEMPLATE		0.2	1.1			6.6	1.3
PHOTO ENGRAVING							
MANUFACTURE KIRKSITE DIES:							0.0
- DROP HAMMER		0.3					
- PUNCH PRESS							0.0
- STRETCH PRESS		0.1					0.0
- HYDROFORM/ROLL FORM		0.2					
FABRICATE METAL PARTS:							0.2
- BAND SAW		0.5	0.7				0.2
- DROP HAMMER	1.0	0.5		0.1			0.8
- PUNCH PRESS	1.1	0.2	2.3	0.2	0.6	0.7	0.9
- ROUTER	2.2	0.4	0.8	0.0	1.2	1.3	0.4
- RADIAL DRAW FORMER			1.0		1.1		0.0
- BELT SANDER		0.2					0.3
- STRETCH PRESS	0.1	0.1	1.0	0.2		0.3	0.0
- SPINNING LATHE	0.3	0.1				0.3	0.6
- HYDROFORM/ROLL FORM	2.9	0.7	0.5	0.2		0.8	1.3
- TURRET PUNCH	4.4		2.3	0.2	1.1		

TABLE 13
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 2 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

MANU. TECH OPERATION \ NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
- SHEAR	1.5	0.7	6.8	3.0	3.1	2.4	3.0
- BRAKE	3.6	0.9	5.3	2.7	2.0	1.7	2.6
- DRILL			0.7				0.1
LAYOUT			1.5				0.2
MANUFACTURE PLASTER PATTERNS AND FORMS		0.3		0.0	0.1		0.1
HEAT TREAT	6.4	0.6					0.8
PACK ALUMINIZE		0.4					0.1
METAL SPRAY:							0.1
- PREPARING FOR SPRAY		0.9					0.0
- METAL SPRAYING		0.2					0.1
- CLEANING/MASKING		0.5					
RIGID METAL TUBING:							0.5
- MANUFACTURE	0.6	1.5	1.5				0.3
- REPAIR	2.1	0.4	0.2		0.1		
FLEXIBLE HOSE:							0.4
- MANUFACTURE		1.4	1.5				
- REPAIR		0.4				0.7	0.2

TABLE 13
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 3 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

MANU. TECH OPERATION \ NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
INCIDENTAL TO WELDING:							
- GRINDING	7.1	2.9	2.6	0.8	2.6	0.7	2.5
- PATCHING	0.6	2.4	1.1	0.6	1.2	1.7	1.3
- RIVETING	7.0	0.8	2.5	0.5	0.8	4.5	2.3
- BLENDING	2.5	1.3	1.3	0.2	1.1	0.6	1.1
- DIE CHECKING	0.4	0.3	0.8	0.2	4.4	0.5	1.4
REPAIR/REPLACE:							
- SKIN PANELS	2.6	4.1	10.5	11.6	4.9	8.3	7.1
- RIBS	2.0	4.2	4.1	3.2	4.5	4.4	3.9
- STRINGERS	1.8	2.8	3.0	3.4	4.5	2.9	3.3
- SPARS	4.7	2.0	1.7	1.7	2.4	5.3	2.8
- FITTINGS	1.4	3.2	3.7	6.4	2.2	4.9	3.6
MANUFACTURE/INSTALL:							
- STRUCTURAL REPAIR PARTS	6.5	20.1	9.6	20.7	4.5	11.5	11.7
REPAIR/SEAL INTEGRAL FUEL CELLS	9.2	1.5	5.0	3.5	1.0	3.5	3.4
REMOVE/TREAT CORROSION	13.3	2.3	8.0	7.0	9.8	14.6	9.1
SPOT/TACK WELDING ON:							
- STEEL		1.2		0.4	0.1		0.3

TABLE 13
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 4 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

MANU. TECH OPERATION \ NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
- STAINLESS STEEL	0.2	1.6		0.2			0.3
REPAIR/MODIFY:							
- AILERONS	0.2	1.1	2.1	0.1	0.8	0.4	0.8
- FLAPS	0.2	1.4	2.3	0.9	0.9	0.4	1.1
- SLATS	0.2	0.1	0.1	0.2	0.2	0.2	0.2
- FINS	0.5	0.3	0.6	2.7	0.9	0.8	1.0
- STABILIZERS	1.4	3.2	1.9	2.4	2.4	0.8	2.1
- VENTRAL FINS	0.2	1.5	0.3	0.1	0.6	0.4	0.5
- LEADING EDGES	0.2	1.1	1.9	1.4	0.6	1.0	1.0
- BONDED PANELS	0.5	0.4		0.6	0.5	0.2	0.4
- FLOOR BOARDS	1.1	1.4	0.2	0.1	0.4	0.5	0.6
- ACCESS PANELS	1.8	4.6	4.8	1.6	1.0	0.9	2.3
- OTHER LAMINATED/ HONEYCOMB STRUCTURES	0.7	0.8	0.5	7.2	1.2	0.2	1.8
COMPLY WITH TECHNICAL DIRECTIVES	7.4	22.1	4.2	15.8	37.2	16.1	19.5
REPAIR FIBREGLASS					0.1		0.0
MISC. SHORING/ADJUSTMENTS				0.2			0.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 14
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 1 OF 2MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: TESTING

MANU. TECH OPERATION	NAVAIREWORKFAC ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
NON-DESTRUCTIVE TESTING:					2.9		0.4
- DYE PENETRANT			7.1	1.4	2.9	4.1	2.4
- MAGNAFLUX							
- ZYGLO/FLUORESCENT PENETRANT			10.9	2.8	7.6	5.1	4.0
- ULTRASONIC			3.7	1.2	0.2	4.1	1.4
- RADIOGRAPHIC			1.3	3.8		5.1	1.7
- EDDY CURRENT			3.2	0.9	0.1	2.0	1.0
OPERATIONAL TESTING (INCL. TEST CELLS)	32.9	57.4	28.4	53.7	36.6		34.3
AUTOMATIC TEST EQUIPMENT:							0.7
- DITMCO <u>1/</u>	0.5			3.0			0.2
- NARF-5500 <u>1/</u>		1.6					9.0
- OTHER <u>1/</u>	12.8	18.1		3.8	20.5		
GROUND CHECK:							6.4
- ENGINES	10.4	2.0	11.8	0.5	4.9	7.2	
- AIRCRAFT	5.2	7.0	16.6	2.5	17.3	41.1	14.0
- ELECTRICAL	5.2	2.8	11.8	2.5	6.6	17.0	7.4
- ELECTRONIC	15.7	1.4	2.4	4.6		14.3	7.5

TABLE 14
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: TESTING

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
ENGINE TESTS:		9.8			0.3		1.1
- BALANCING				11.3			2.2
- DRESSING				7.5			1.5
- UNDRESSING				0.2			0.0
NITAL ETCH				0.0			0.0
COPPER SULFATE TEST							4.2
ASSEMBLY/MODIFY	17.2		2.6				0.4
OIL ANALYSIS							
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1/ SEE ALSO TABLE 11 - "ELECTRICAL/ELECTRONIC"							

TABLE 15
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 1 OF 3

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: MACHINING

MANU. TECH OPERATION	NAVAIREWORKFAC ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
SHAPING	0.6		0.1	0.5	0.2	0.8	0.4
GRINDING:							
- INTERNAL	5.2	4.4	10.9	3.7	3.8	5.4	5.1
- EXTERNAL	7.6	9.1	9.7	9.9	10.5	20.3	11.4
- SURFACE	2.4	3.0	3.0	3.1	0.8	2.8	2.2
- ELECTROLYTIC	1.2		1.7	0.6	0.1	0.1	0.5
MILLING:							
- POCKET	3.9	1.4	3.0	8.3	4.7	2.4	4.3
- GANG	3.5	5.0		0.1	1.5	0.9	1.6
- ANGULAR	3.1	10.7	3.1	4.9	4.6	2.1	4.3
- INDEX	3.5	7.7	2.9	1.1	3.3	2.2	3.1
- SPECIAL	3.5	3.2	7.1	1.1	4.2	7.1	4.3
ELECTRICAL DISCHARGE MACHINE	3.0		2.3	2.8	0.3	1.2	1.5
TURNING	12.9	21.0	15.1	10.8	9.4	9.4	11.9
BORING/JIG BORING	6.0	12.9	11.5	4.4	6.8	14.7	8.6
FACING	2.4	3.6	1.7	4.2	2.7	3.3	3.0
TAPPING	3.2	2.1	1.1	1.4	1.9	1.9	2.0
THREADING	2.2	2.9	1.9	0.7	1.0	1.1	1.4
SUPER FINISHING	1.2	1.4	0.6	0.1	0.8	0.4	0.7

TABLE 15
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 2 OF 3

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: MACHINING

MANU. TECH OPERATION \ NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
LAPPING					1.7		0.5
DRILLING/SLOTING	5.8	3.1	7.4	4.6	12.4	12.0	8.6
HONING	2.6	0.7	0.7	1.7	2.8	0.3	1.8
PUNCHING					0.4		0.1
SPOT FACING	2.8	0.4	0.5	0.2	2.0	1.5	1.4
ENGRAVING					0.5		0.2
COUNTER-SINKING	2.8	0.4	0.6	0.3	3.5	1.9	2.0
VALVE GRINDING			2.3		0.1		0.3
DEBURRING					0.1		0.0
MODIFICATION/REPAIR OF TOOLING	9.7	1.7	7.3	4.1	3.0	2.2	4.5
MAINTAIN RESTRIKE DIES				1.1			0.2
RESTRIKE (HOT FORMING) OF AIRCRAFT ENGINE NOZZLE GUIDE VANES				0.7			0.1
REPLACE:							
- BUSHINGS	2.6	1.8	2.0	1.3	2.4	3.9	2.4
- BEARINGS	2.6	0.7	0.6	1.0	5.6	0.5	2.5
- FITTINGS	0.6	1.4	0.9	0.6	5.6	0.3	2.1
- TRANSFER TUBES	1.2			0.4	2.0		0.9

TABLE 15
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 3 OF 3

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: MACHINING

MANU. TECH OPERATION \ NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
REPLACE: (Cont'd)							
- HELICOILS/INSERTS		0.6			0.5		0.2
- GUIDES	1.6			0.4	0.1		0.4
- CONE SEATS	0.4			0.4			0.1
- STUDS	2.4	0.8	0.2	0.3	0.8	1.3	1.0
METALLIZE				12.4			2.1
REMOVE/REWORK/INSTALL CATAPULT/ARRESTING GEAR				12.6			2.1
ELECTRON BEAM WELDING			1.7				0.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 16
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: HYDRAULIC/PNEUMATIC

NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
MANU. TECH OPERATION							
DISASSEMBLE	16.9	14.1	10.0	21.8	9.4	10.0	14.6
CLEAN	5.4	7.9	3.8	5.2	3.4	3.0	5.1
INSPECT	6.9	4.0	5.7	5.4	9.6	10.0	6.9
REPAIR/REWORK	15.0	10.9	24.0	12.9	13.1	17.0	14.6
MODIFY	4.5	3.3	3.0	4.1	9.4	5.0	5.1
REASSEMBLE/BALANCE	29.7	40.7	18.0	34.6	37.8	30.0	32.7
TEST	21.5	19.1	35.5	16.1	17.4	25.0	21.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 17
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: STRIP/FINISH/PAINT

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
CLEANING:							
- STRIPPING	19.8	18.5	8.9	2.3	21.2	15.3	15.3
- DEGREASING		1.0	1.8	0.4	1.9	0.7	1.2
- VACUBLASTING/SEED BLASTING		4.9	4.7		3.7		2.7
- CORROSION TREATING		3.9	1.6	1.0	4.2	0.2	2.1
- TANK SOAKING		2.7	0.9	0.4	0.3	1.5	0.9
- WATER SPRAY	2.8	2.5	6.3		2.7	2.4	3.2
- SCRAPING	2.8	1.3	3.1	1.0	1.6	3.1	2.3
- STEAMING	2.8	5.6	9.9	0.4	6.8	3.9	5.8
- MASKING					3.4		0.9
SEALING/CORROSION TREATMENT		1.8	1.7	18.7	2.6	1.9	3.2
PAINTING:							
- CLEANING	10.8	7.5	17.0	3.8	13.0	9.6	11.6
- MASKING/TAPING/ UNMASKING	15.4	18.2	17.0	20.0	11.0	17.9	15.7
- DOPING FABRIC	2.4						0.4
- SANDING					3.1		0.8
- PAINTING	32.2	26.4	17.8	25.0	15.5	25.4	22.2

TABLE 17
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG 2 OF 2

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: STRIP/FINISH/PAINT

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
REPAIR/RECONDITION OLD FABRIC SURFACES				18.1	7.2	18.2	9.8
APPLY MARKINGS/DECALS	10.8	5.8	5.9	7.6			1.4
MANUFACTURE DECALS/ID PLATES			3.3				
POWDER COATING/CODEP PROCESS/ BLACK OXIDE				1.3	2.0		0.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

4. Repair and/or replace skin panels.
 5. Repair and/or replace ribs.
- Testing
 1. Operational testing (including test cell operation).
 2. Ground check of aircraft.
 3. "Other" automatic test equipment.
 4. Ground check of electronic equipment.
 5. Ground check of electrical equipment.
 - Machining
 1. Turning.
 2. External grinding.
 3. Boring and jig boring.
 4. Drilling and slotting.
 5. Internal grinding.
 - Hydraulic/Pneumatic
 1. Reassemble and balance.
 2. Test.
 3. Disassemble.
 4. Repair and rework.
 5. Inspect.
 - Strip/Finish/Paint
 1. Painting.
 2. Masking, taping and unmasking (for painting).
 3. Stripping (for cleaning).
 4. Cleaning (for painting).
 5. Apply markings and decalcomanias.

For each of the elemental cost drivers noted above, the percent of that cost driver within its MT functional category was determined and is given in Figure 16. The top five elemental cost drivers within each MT functional category were then added together. The percent of total NAVAIREWORKFAC direct labor costs for each MT functional category was also identified. From these data, the percent of total NAVAIREWORKFAC direct labor costs represented by the total elemental cost drivers noted above could be determined. By concentrating on the 35 elemental cost drivers so noted, 44.5% of the total NAVAIREWORKFAC direct labor costs were included.

FIGURE 16

**"TOP FIVE" ELEMENTAL COST DRIVERS
(PERCENT OF MT FUNCTIONAL CATEGORY)**

	MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY							
	ELECTRICAL/ ELECTRONIC	DISASSEMBLE/ ASSEMBLE	SHEET METAL	TESTING	MACHINING	HYDRAULIC/ PNEUMATIC	STRIP/ FINISH/ PAINT	TOTAL FOR PROD. SHOPS SURVEYED
COST DRIVER NO. 1	13.8	43.1	19.5	34.3	11.9	32.7	22.2	24.3
COST DRIVER NO. 2	9.2	9.9	11.7	14.0	11.4	21.0	15.7	11.8
COST DRIVER NO. 3	9.2	8.4	9.1	9.0	8.6	14.6	15.3	9.9
COST DRIVER NO. 4	9.0	7.6	7.1	7.5	8.6	14.6	11.6	8.8
COST DRIVER NO. 5	7.3	7.4	3.9	7.4	5.1	6.9	9.8	6.6
TOTAL (COST DRIVERS NO. 1 – NO. 5)	48.5	76.4	51.3	72.2	45.6	89.8	74.6	61.5
PERCENT TOTAL NAVAIREWORKFAC DIRECT LABOR COSTS FOR MT FUNCTIONAL CATEGORY	20.0	16.7	13.8	6.9	6.0	4.7	4.0	72.1
PERCENT TOTAL NAVAIREWORKFAC DIRECT LABOR COSTS FOR "TOP FIVE" COST DRIVERS	9.7	12.8	7.1	5.0	2.7	4.2	3.0	44.5

SECTION VII

CONCLUSIONS

Based on the data synthesized and analyzed in this MT study, it was concluded that:

- Although a great deal of performance data is available for NAVAIREWORKFAC products, i.e. aircraft, missiles, engines, components (F/E material), other support and manufacturing, there is a paucity of data related to processes performed in the NAVAIREWORKFAC industrial operations.

Some process information is tabulated in N/C Machine Utilization Reports, the Geographical Area Report (at NAVAIREWORKFAC Jacksonville), and to some extent LAGTAB Segment Reports.

- It was possible to define manufacturing technology (MT) functional categories which were universal and applicable to all NAVAIREWORKFACS.

- Direct labor costs are more susceptible to influence and control by local management authorities than are direct material costs. Direct material costs are more greatly affected by decisions of the material acquisition manager and the engineering (i.e. technical) managers.

- The "top seven" MT functional categories include 72% of direct labor costs and 63% of direct material costs. Of these "top seven" categories, the first five categories listed are common to both direct labor costs and direct material costs (although the rank order listing is rearranged after the first two categories listed).

- The highest direct labor costs exist in the aircraft rework program, followed by the component F/E material rework program.

- The highest direct material costs exist in the component F/E material rework program, followed by the engine rework program.

- For the aircraft rework program, the highest cost MT sub-function involved "install, attach, rework" type of work. The highest cost system involved "structures" for two of the three aircraft studied, and "electrical" for the third aircraft. These conclusions, which were based on MDR analysis, were generally substantiated by the aircraft LAGTAB segments analysis.

- For the engine rework program, the highest cost MT effort involved "CER and Minor Repair" work which is somewhat similar to the "install, attach, rework" type of work noted above. Likewise, this conclusion, which was based on engine LAGTAB segments analysis, was substantiated by the MDR analysis of the T56, J79 and LM1500 engines.

- Among numerical control machines, machining centers performed the highest percentage of work both in terms of production time and cutting time. N/C lathe work was the second highest cost operation.

- The sum of the "top five" elemental direct labor cost drivers from each of the "top seven" MT functional categories accounted for 44.5% of the total direct labor costs.

● Although the product lines varied considerably among the NAVAIREWORKFACs, the percentage distribution of direct labor costs among the largest MT functional categories was relatively stable. These data will provide a reasonable basis for further manufacturing technology considerations and effort. However, to insure that future MT efforts are being focused on the appropriate MT functional categories, a periodic update of the data contained in this study would be desirable. This would be most easily done by those NAVAIREWORKFACs (i.e., Alameda, Norfolk and North Island) which are now on the Manufacturing Analysis Retrieval System (MARS).

● Though focused on identifying cost drivers which are susceptible to improving overall productivity through the application of manufacturing technology, the study results can be applied to other areas of concern to NAVAIREWORKFAC management. Some of these areas of consideration are:

- Staffing plans
 - New hires
 - Reassignments
- Training programs
 - Product oriented
 - Apprentice
- Equipment purchase
- Support functions
- Handling & transportation

SECTION VIII

RECOMMENDATIONS

It is recommended that:

- Local NAVAIREWORKFAC management take action to initiate manufacturing technology projects where appropriate with respect to the following functional categories:

- Electrical/Electronic
- Disassemble/Assemble
- Sheet Metal
- Testing
- Machining
- Hydraulic/Pneumatic
- Strip/Finish/Paint

Inasmuch as these functions are common to all NAVAIREWORKFACS, MT projects should be coordinated to insure maximum cost effectiveness and eliminate possible duplication. It is further recommended that prototype installations of MT projects be made at a single NAVAIREWORKFAC and thus be proven operationally before installing the project at the balance of the NAVAIREWORKFACS. The functional categories listed above represent the direct labor high cost drivers. The sum of the five highest elemental cost drivers in each of the seven functional categories listed constitute 44.5% of total direct labor costs. It is recommended that these elemental cost drivers be referred to in allocating resources to proposed manufacturing technology projects.

- Plant arrangement to facilitate movement of work.

● Material acquisition management take action to review and initiate manufacturing technology projects where appropriate related to material used by the NAVAIREWORKFACs in the following functional categories:

- Electrical/Electronic
- Disassemble/Assemble
- Hydraulic/Pneumatic
- Machining
- Sheet Metal
- Helicopter Dynamic Components
- Compressor/Turbine/Engine Metal Repair

● MT functional category data be updated periodically to insure that planned and ongoing MT effort is focused on the appropriate MT functional categories. To assist in gaining this objective, the Manufacturing Analysis Retrieval System (MARS) should be expanded to cover those NAVAIREWORKFACs (i.e., Cherry Point, Jacksonville and Pensacola) not now on this system.

● Results of this study be used as appropriate in all phases of NAVAIREWORKFAC operation. Pertinent phases are considered to be:

- Formulation of staffing plans
- Planning for training programs
- Providing support functions
- Identifying construction, plant equipment and material handling needs.

GLOSSARY OF TERMS

Acquisition manager - Individual responsible for the acquisition of weapon systems, individual items of equipment and facilities, and for planning the logistic support of these end items.

Complete Engine Repair (CER) - The repair of engines beyond that depth authorized for intermediate maintenance action but not to the extent of overhaul.

Cost driver - Any process, function or part which contributes significantly to the cost of an operation.

Functional category - Generic identification of those production or process oriented functions which are performed by the naval air rework facilities.

Master Data Record (MDR) - Production engineering process specification for the rework of a product.

Technical directive - Document providing technical information necessary to properly and systematically inspect or alter the configuration of aircraft, engines, systems, or equipments subsequent to establishment of each respective baseline configuration.

LIST OF ABBREVIATIONS AND ACRONYMS

AMP	Analytical maintenance program
CER	Complete engine repair
CODEP	Co-deposition (process)
DLM	Depot level maintenance
LAGTAB	Local Analysis Grouped and Tabulated for Apportionment of Budgets
MDR	Master data record
MT	Manufacturing technology
NAVAIREWORKFAC	Naval air rework facility
N/C	Numerical control
NDT	Non-destructive testing
SDLM	Standard depot level maintenance
SLEP	Service life extension program
TMS	Type-model-series

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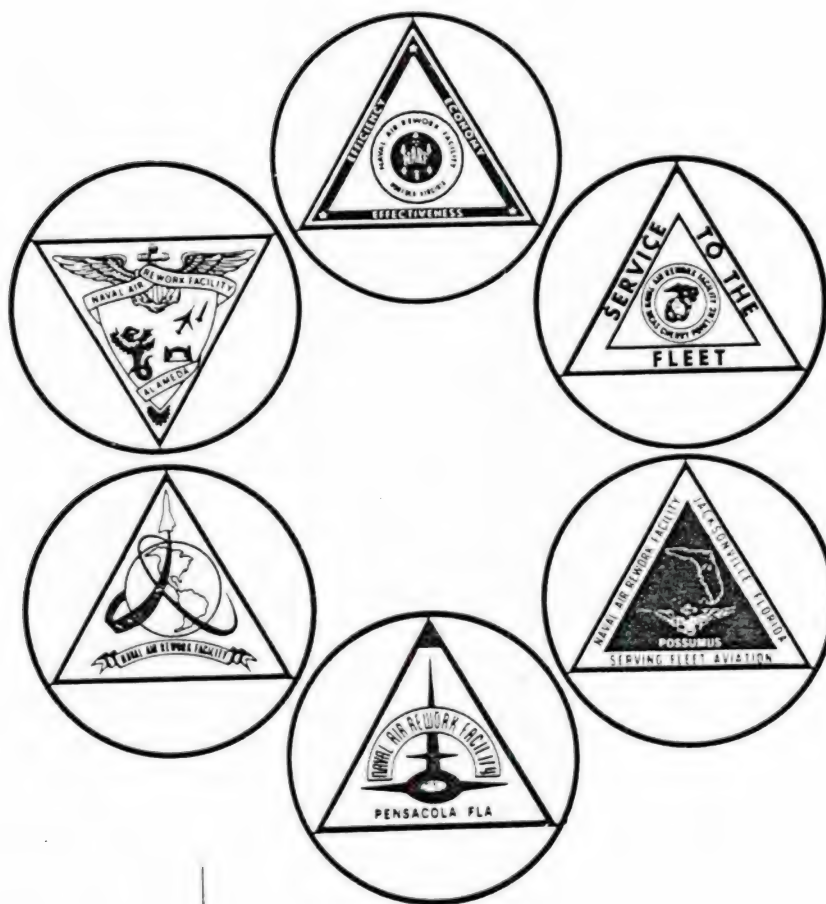
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MANUFACTURING TECHNOLOGY COST DRIVERS STUDY OF AIRCRAFT REWORK, OVERHAUL AND REMANUFACTURE PROCESSES

VOLUME II - ADDENDUM



CONTAINS SENSITIVE INFORMATION
WHICH SHOULD BE DISSEMINATED
PRUDENTLY.

JANUARY 31, 1979



FOREWORD

This addendum is the second of a two-volume report on the Manufacturing Technology (MT) Cost Drivers Study of Aircraft Rework, Overhaul and Remanufacture Processes. It is a compendium of the actual cost and utilization data collected during the study. Wherever possible, the data covers the base period of July 1, 1977 to Dec. 31, 1977. For practical reasons, it was not possible to collect data covering this specific period in every case. In those instances where a different time period was applicable, the data were factored to a six month period corresponding to the base period. All percentage data displayed in Volume I of this report were calculated by normalizing the data contained in this addendum. By confining the display of actual dollars or hours to the data in Volume II, indiscriminate proliferation of these data could be avoided and the integrity of the data base could be protected properly by controlling the distribution of Volume II.

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SECTION I
INTRODUCTION

Actual costs in dollars or hours which were incurred by the NAVAIREWORKFACS during the periods cited are contained in this volume. Wherever possible, existing reports were used to obtain the pertinent data for the manufacturing technology (MT) cost drivers study of aircraft rework, overhaul and remanufacture processes. The source documents used and the figures containing these data are:

- NAVAIREWORKFAC financial records -
Figures A-1 through A-30
- N/C Machine Utilization Report -
Figures A-31 through A-50
- Geographical Area Report -
Figures A-51 & A-52

The utilization of each numerical control (N/C) machine at each NAVAIREWORKFAC is reported upon monthly. This N/C Machine Utilization Report includes both production and non-production time. Production time is the sum of cutting, prove-out, set-up, warm-up and clean-up times. Non-production time is the sum of no work, no operator, no tools, maintenance or other miscellaneous down times. Utilization is defined as the ratio of total production time to total scheduled time.

To determine elemental cost drivers, it was necessary to design and use a special report. This report surveyed the work of the production shops in the seven most costly MT functional categories at all of the NAVAIREWORKFACS. The results of this survey are given in Tables A-1 through A-7.

SECTION II

DISCUSSION

In the course of the manufacturing technology (MT) cost drivers study, functional categories were identified to delineate processes required in the rework, overhaul and remanufacture of naval aircraft and aeronautical material. Though it was possible to identify many generic processes, it was found that some efforts were so product oriented that it was impractical to classify that work generically. Therefore, a list of "miscellaneous" functional categories evolved. Also, in some cases, additional "miscellaneous" functional categories were added by specific NAVAIREWORKFACS as was appropriate for their workload. Though other NAVAIREWORKFACS may work on some of the same "miscellaneous" products, the total production cost was below the threshold at which the high cost drivers of interest would be affected. For that reason, no effort was made to complete the data base for these particular "miscellaneous" items.

In determining percentages given in Volume I, the convention was adopted to use "0.0" when there was a measurable degree of effort reported in the data base but which calculated to be less than 0.05%.

Although there was a consensus among the study team members of how the total industrial operation should be grouped into MT functional categories, some of the data collected represented a combination of two or more MT functional

categories. This has been explained by notes on the appropriate figures in this volume. It is considered that these combinations did not affect the final cost driver study results significantly.

For the elemental operations covered in the production shop survey, no special effort was made to define the terms used. It was considered that the terms were reasonably well-known within the NAVAIREWORKFAC community and further definition was not warranted. For each of the shops surveyed, the number of direct workers, less supervision, was identified. Actual estimates of the time or percentage of time devoted to performing each elemental operation within that shop were made by the first-line supervisor of the shop. By this approach, it was considered that the survey would identify the actual operations being performed currently by the NAVAIREWORKFAC production organization. For each shop, the first-line supervisors' estimates were converted arithmetically to the number of "equivalent people" performing the elemental operation listed. This, then, formed the data base which led to the determination of the elemental cost drivers. The data base reported on a total of 7512 people working within the "top seven" direct labor cost driver functional categories at the six naval air rework facilities.

SECTION III

SUMMARY

Some of the actual costs which comprised the primary cost drivers are given below. All dollar values given are for the six month base period of July 1, 1977 to December 31, 1977 except where noted on the individual figure in this addendum.

- For direct labor only, the "top seven" most costly MT functional categories were:

- Electrical/Electronic: \$22.1M
- Disassemble/Assemble: \$18.5M
- Sheet Metal: \$15.3M
- Testing: \$7.7M
- Machining: \$6.7M
- Hydraulic/Pneumatic: \$5.2M
- Strip/Finish/Paint: \$4.5M

- For direct material only, the "top seven" most costly MT functional categories were:

- Electrical/Electronic: \$17.5M
- Disassemble/Assemble: \$14.4M
- Hydraulic/Pneumatic: \$12.6M
- Machining: \$7.2M
- Sheet Metal: \$6.7M
- Helicopter Dynamic Components: \$4.9M
- Compressor/Turbine/Engine Metal Repair: \$4.2M

- For specific rework programs, those with the highest direct labor costs were:

- Aircraft rework: \$49.7M
- Component F/E material rework: \$32.8M

- For specific rework programs, those with the highest direct material costs were:

- Component F/E material rework: \$54.3M
- Engine rework: \$23.5M

- For all NAVAIREWORKFAC MT functional categories the total direct costs were:

- Direct labor: \$110.7M
- Direct material: \$107.9M
- Direct labor and direct material: \$218.6M

Conclusions and recommendations are given in Volume I of this report.

FIGURE A-1
AIRCRAFT REWORK
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	589,592	218,551	15,642	352,908	546,341	396,999	2,120,033	4.3
DISASSEMBLE/ASSEMBLE	873,716	1,630,160	436,763	3,303,271	4,723,373	1,986,150	12,953,433	26.1
ELECTRICAL/ELECTRONIC	710,274	885,376	488,462	1,632,044	2,663,134	1,359,509	7,738,799	15.6
HYDRAULICS/PNEUMATICS	241,376	58,028	85,751	199,651	104,798	82,976	772,580	1.6
BONDING	200,818	1,557	-	-	14	191,712	394,101	0.8
STRIP/FINISH/PAINT	674,871	297,037	465,529	350,587	739,598	581,799	3,109,421	6.3
WELD	91,587	5,388	12,197	24,161	11,627	24,453	169,413	0.3
MACHINE	39,116	76,422	81,849	177,147	596,403	229,819	1,200,756	2.4
WIRE CUT/MANUFACTURING	-	28,002	12,771	148,088	12,403	-	200,094	0.4
FORGE/FOUNDRY	21,770	4,192	2,697	0	170	2,609	20,553	0.0
LAYOUT/PATTERN	-	9,421	-	5,072	3,970	14,915	44,263	0.1
SHEET METAL	1,382,106	751,683	764,955	2,805,798	3,047,283	2,436,441	11,188,266	22.5
CLEAN, ABRASIVE	221,100	9,372	29,403	137,365	25,761	2,981	315,432	0.6
CLEAN, CHEMICAL	-	111,136	-	217,108	932	478,696	918,422	1.8
HEAT TREAT	8,086	-	2,664	-	-	24,454	35,204	0.1
PLATING	32,589	14,023	19,955	66,603	-	71,451	204,621	0.4
PACKING/PRESERVATION	1,385	6,140	15,692	27,384	40,217	125,410	216,228	0.4
CALIBRATION	6	129	97	114	97,489	78	97,913	0.2
TESTING	998,540	13,651	246,410	586,215	2,148,102	790,602	4,783,520	9.6
MISCELLANEOUS-								
ARMAMENT	133,395	41,755	29,704	273,025	94,642	184,942	757,463	1.5
BEARINGS	7,095	1,635	7,996	-	-	27,331	44,057	0.1
BLADES - PROP	-	-	1,071	13,410	-	-	14,481	0.0
ROTOR	-	7,980	-	-	55,663	63,616	127,259	0.3
CONTROL CABLES	-	-	954	-	-	25,748	26,702	0.1
EJECTION SEAT	-	-	15,490	64,829	-	-	80,319	0.2
FABRIC/RUBBER/PLASTICS	143,474	158,263	43,375	61,407	191,399	121,482	719,400	1.4
FLIGHT CONTROLS & SUBASSM.	-	-	377,644	-	-	-	377,644	0.8
FUEL CONTROLS & ACCESSORIES	-	-	4,356	409,318	3,923	-	417,597	0.8
GROUND SUPPORT EQUIPMENT	34,622	134	2,337	981	283,866	2,260	324,200	0.7
LANDING GEAR	76,146	16,517	21,098	31,297	-	129,592	274,650	1.0
MECHANICAL MODS. & REPAIR	-	-	416	-	-	-	416	0.0
COMPRESSOR/TURBINE/ENGINE	-	-	152	-	-	-	152	0.0
METAL REPAIR	-	-	-	-	-	-	-	-
CYLINDER & PISTON	-	-	-	-	-	-	-	-
PROTOTYPE	-	-	-	-	3,874	-	3,874	0.0
FIELD SERVICE	-	-	-	4,000	-	974	4,974	0.0
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	18,523	18,523	0.0
TOTAL	6,481,664	4,346,552	3,185,430	10,891,783	15,394,622	9,375,522	49,675,573	100.0
%	13.0	8.7	6.4	21.9	31.0	18.9	100.0	

MT FUNCTIONAL CATEGORY	NAVAIREWORKFAC	ALAMEDA	NORFOLK	TOTAL	
EXAMINATION/EVALUATION	0	39,022	39,022	2.4	
DISASSEMBLE/ASSEMBLE	207,373	0	207,373	12.7	
ELECTRICAL/ELECTRONIC		122,854	122,854	7.5	
HYDRAULICS/PNEUMATICS		0	0	0.0	
BONDING	194		194	0.0	
STRIP/FINISH/PAINT	1,909	26,722	28,631	1.8	
WELD	75	109	184	0.0	
MACHINE	547	1,775	2,322	0.1	
WIRE CUT/MANUFACTURING	237	11,147	11,384	0.7	
FORGE/FOUNDRY		0		0.0	
LAYOUT/PATTERN	151		151	0.0	
SHEET METAL	25	368	393	0.0	
CLEAN, ABRASIVE	72	6,846	6,918	0.4	
CLEAN, CHEMICAL	1,097	11,059	12,156	0.7	
HEAT TREAT	0		0	0.0	
PLATING	278	9,063	9,341	0.6	
PACKING/PRESERVATION	19		19	0.0	
CALIBRATION	0	111	111	0.0	
TESTING	582,672	133,440	716,112	44.0	
MISCELLANEOUS-					
ARMAMENT		470,199	470,199	28.9	
BEARINGS					
BLADES - PROP		1	1	0.0	
ROTOR					
CONTROL CABLES					
EJECTION SEAT					
FABRIC/RUBBER/PLASTICS					
FLIGHT CONTROLS & SUBASSM.					
FUEL CONTROLS & ACCESSORIES					
GROUND SUPPORT EQUIPMENT					
LANDING GEAR					
MECHANICAL MODS. & REPAIR					
COMPRESSOR/TURBINE/ENGINE					
METAL REPAIR					
CYLINDER & PISTON					
PROTOTYPE					
FIELD SERVICE					
HELO DYNAMIC COMPONENTS					
TOTAL	794,649	832,716	1,627,365	100.0	
	48.8	51.2	100.0		

FIGURE A-2
MISSILE REWORK
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

FIGURE A-3
ENGINE REWORK
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	185,638	66,687	60,399	267,638	85,138	NO ENGINE REWORK	665,500	6.4
DISASSEMBLE/ASSEMBLE	1,125,308	730,067	485,396	960,709	255,324		3,556,804	34.3
ELECTRICAL/ELECTRONIC	20,934	26,701	48,835	26,894	385,599		508,963	4.9
HYDRAULICS/PNEUMATICS	470,212	174,266	14,478	74,609	-		733,565	7.1
BONDING	1,513	-	-	-	52		1,565	0.0
STRIP/FINISH/PAINT	79	42,829	51,446	9,155	60,084		163,593	1.6
WELD	1,014	36,780	101,119	120,899	76,927		336,739	3.2
MACHINE	419,989	146,834	273,250	456,875	246,757		1,543,705	14.9
WIRE CUT/MANUFACTURING	-	10,131	1,661	2,440	69		14,301	0.1
FORGE/FOUNDRY	-	3,626	3,330	0	-		6,956	0.1
LAYOUT/PATTERN	-	155	-	67	-		222	0.0
SHEET METAL	13,397	114,021	10,555	1,848	99,841		239,662	2.3
CLEAN, ABRASIVE	-	40,632	95,582	133,074	10,466		279,896	2.7
CLEAN, CHEMICAL	284	44,286	-	36,977	77,216		158,621	1.5
HEAT TREAT	320	-	9,957	-	73,553		83,830	0.8
PLATING	3,824	23,557	128,831	73,154	21,568		250,934	2.4
PACKING/PRESERVATION	32,947	45,037	35,618	1,270	109		114,981	1.1
CALIBRATION	0	-	88	40	-		128	0.0
TESTING	0	204,576	125,767	254,172	126,213		710,728	6.8
MISCELLANEOUS-								
ARMAMENT	41	-	-	36,972	1,231		38,244	0.4
BEARINGS	47,979	24,606	9,812	-	-		82,397	0.8
BLADES - PROP	-	-	-	219,864	-		219,864	2.1
ROTOR	-	-	-	-	808		808	0.0
CONTROL CABLES	-	-	-	-	-		-	-
EJECTION SEAT	-	-	-	9,029	-		9,029	0.1
FABRIC/RUBBER/PLASTICS	-	3,585	3,423	585	3,065		10,658	0.1
FLIGHT CONTROLS & SUBASSM.	-	-	28	-	-		28	0.0
FUEL CONTROLS & ACCESSORIES	-	-	178,424	190,959	55,664		425,047	4.1
GROUND SUPPORT EQUIPMENT	92	-	-	130	-		222	0.0
LANDING GEAR	-	-	-	4,359	-		4,359	0.0
MECHANICAL MODS. & REPAIR	-	-	-	-	-		-	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-	-	166,392	-	-		166,392	1.6
CYLINDER & PISTON	-	-	53,549	-	-		53,549	0.5
PROTOTYPE	-	-	-	-	24		24	0.0
FIELD SERVICE	-	-	-	306	-		306	0.0
HELO. DYNAMIC COMPONENTS	-	-	-	-	-		-	-
TOTAL	2,323,571	1,738,376	1,857,940	2,882,025	1,579,708		10,381,620	100.0
%	22.4	16.7	17.9	27.8	15.2		100.0	

FIGURE A-4

COMPONENT F/E MATERIAL
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	374,008	250,987	35,996	24,073	52,626	24,743	762,433	2.3
DISASSEMBLE/ASSEMBLE	37,266	419,030	8,036	135,332	145,332	168,806	913,802	2.8
ELECTRICAL/ELECTRONIC	2,726,936	894,593	1,709,887	2,171,802	1,500,405	2,929,895	11,933,518	36.4
HYDRAULICS/PNEUMATICS	1,513,458	466,791	224,488	281,278	357,499	699,479	3,542,993	10.8
BONDING	128,663	157,879	-	-	173,946	2,389	462,877	1.4
STRIP/FINISH/PAINT	70,083	131,022	137,194	59,888	143,386	152,243	693,816	2.1
WELD	34,077	40,378	44,720	76,234	40,878	42,840	279,127	0.9
MACHINE	219,113	253,976	225,000	221,960	501,899	560,062	1,982,010	6.1
WIRE CUT/MANUFACTURING	-	14,345	24,473	197,064	8,488	-	244,370	0.7
FORGE/FOUNDRY	-	8,592	2,818	0	128	6,330	19,648	0.1
LAYOUT/PATTERN	3,560	7,210	-	887	403	2,214	12,494	0.0
SHEET METAL	307,696	389,336	271,562	170,253	202,824	90,912	1,432,583	4.4
CLEAN, ABRASIVE	-	105,111	90,158	66,040	55,575	162,334	546,087	1.7
CLEAN, CHEMICAL	133,738	118,332	-	42,375	22,847	5,209	255,632	0.8
HEAT TREAT	14,909	-	5,254	-	177,120	42,841	240,124	0.7
PLATING	63,903	95,573	100,297	130,832	142,772	130,086	663,463	2.0
PACKING/PRESERVATION	186,626	132,703	170,796	90,697	54,054	117,544	752,420	2.3
CALIBRATION	297,216	24,726	162,161	155,908	579,590	163,377	1,382,978	4.2
TESTING	122,443	149,929	250	294,037	114,247	79,584	760,490	2.3
MISCELLANEOUS-								
ARMAMENT	375,185	39,878	193,131	142,264	62,003	78,895	891,356	2.7
BEARINGS	162,113	46,474	30,076	-	-	182,353	421,016	1.3
BLADES - PROP	-	-	43,875	190,313	-	-	234,188	0.7
ROTOR	-	407,161	-	-	373,895	39,881	820,937	2.5
CONTROL CABLES	-	-	3,238	-	-	13,296	16,534	0.1
EJECTION SEAT	-	-	2,534	101,186	-	-	103,720	0.3
FABRIC/RUBBER/PLASTICS	38,213	52,989	31,754	38,053	0	25,572	186,581	0.6
FLIGHT CONTROLS & SUBASSM.	-	-	5,385	-	-	-	5,385	0.0
FUEL CONTROLS & ACCESSORIES	-	-	163,874	262,395	31,927	-	458,196	1.4
GROUND SUPPORT EQUIPMENT	532,227	59,548	210,321	277,176	336,156	55,147	1,470,575	4.5
LANDING GEAR	71,571	77,198	26,832	48,848	-	84,492	308,941	0.9
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	41,837	-	-	-	41,887	0.1
METAL REPAIR	-	-	-	-	-	-	-	-
CYLINDER & PISTON	-	-	29,329	-	-	-	29,329	0.1
PROTOTYPE	-	-	-	-	1,425	-	1,425	0.0
FIELD SERVICE	-	-	-	158,496	-	154	158,650	0.5
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	729,689	729,689	2.2
TOTAL	7,413,004	4,343,761	3,995,326	5,337,391	5,079,425	6,590,367	32,759,274	100.0
%	22.6	13.3	12.2	16.3	15.5	20.1	100.0	

MT FUNCTIONAL CATEGORY	NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION		158,583	24,476	5,207	62,384	97,679	31,183	379,512	3.3
DISASSEMBLE/ASSEMBLE		70,139	198,362	44,545	160,521	298,012	69,801	841,380	7.2
ELECTRICAL/ELECTRONIC		66,556	128,406	127,688	525,142	308,926	516,231	1,672,949	14.4
HYDRAULICS/PNEUMATICS		54,866	26,649	20,574	46,313	-	26,082	174,484	1.5
BONDING		20,049	531	-	-	224	57	20,861	0.2
STRIP/FINISH/PAINT		23,608	15,255	79,344	53,630	65,711	60,966	298,514	2.6
WELD		22,871	2,530	12,041	38,222	14,339	10,008	100,011	0.9
MACHINE		63,697	36,496	28,776	205,436	89,469	161,941	585,815	5.0
WIRE CUT/MANUFACTURING		-	19,676	1,966	47,650	17,272	-	86,564	0.7
FORGE/FOUNDRY		-	2,053	1,330	0	3,179	37,929	46,162	0.4
LAYOUT/PATTERN		3,341	709	-	26,598	3,487	115,293	147,757	1.3
SHEET METAL		409,759	117,121	196,571	577,662	178,827	375,042	1,854,982	15.9
CLEAN, ABRASIVE		-	5,249	14,473	23,853	6,345	505	57,052	0.5
CLEAN, CHEMICAL		13,254	8,349	-	25,554	1,885	17,404	59,819	0.5
HEAT TREAT		1,348	-	613	-	7,459	10,007	19,427	0.2
PLATING		7,381	2,237	4,115	24,237	5,581	19,732	63,283	0.5
PACKING/PRESERVATION		299,427	11,578	79,088	196,102	198,155	190,937	975,287	8.4
CALIBRATION		560,309	142,484	259,241	292,230	510,929	168,146	1,933,339	16.6
TESTING		122,200	14,327	43,458	152,122	289,998	48,379	670,484	5.8
MISCELLANEOUS-									
ARMAMENT		12,279	38,128	61,516	58,806	3,451	22,831	197,011	1.7
BEARINGS		35,036	1,539	5,545	-	-	4,378	46,498	0.4
BLADES - PROP		-	-	445	48,820	-	-	49,265	0.4
ROTOR		-	5,137	-	-	4,286	3,232	12,655	0.1
CONTROL CABLES		-	-	264	-	-	5,884	6,148	0.1
EJECTION SEAT		-	-	1,440	29,243	-	-	30,683	0.3
FABRIC/RUBBER/PLASTICS		20,128	12,734	11,150	7,135	0	22,251	73,398	0.6
FLIGHT CONTROLS & SUBASSM.		-	-	10,091	-	-	-	10,091	0.1
FUEL CONTROLS & ACCESSORIES		-	-	13,700	83,906	5,068	-	102,674	0.9
GROUND SUPPORT EQUIPMENT		54,060	3,991	74,468	844	398,369	7,571	539,303	4.6
LANDING GEAR		4,259	5,106	1,708	14,117	-	3,842	29,032	0.2
MECHANICAL MODS. & REPAIR		-	-	76,064	-	-	-	76,064	0.7
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		-	-	3,254	-	-	-	3,254	0.0
CYLINDER & PISTON		-	-	1,522	-	-	-	1,522	0.0
PROTOTYPE		-	-	-	-	14,946	-	14,946	0.1
FIELD SERVICE		-	-	-	179,798	-	257,016	436,814	3.8
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	29,191	29,191	0.3
TOTAL		2,023,150	823,123	1,180,197	2,880,325	2,523,597	2,215,839	11,646,231	100.0
%		17.3	7.1	10.1	24.7	21.7	19.0	100.0	

FIGURE A-5
OTHER SUPPORT
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

FIGURE A-6
MANUFACTURING
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	
EXAMINATION/EVALUATION	22,960	234	943		880		25,017	0.5
DISASSEMBLE/ASSEMBLE	99	55		108	16,288	10,339	26,889	0.6
ELECTRICAL/ELECTRONIC	105,858	735	9,259	15,973	18,111	11,411	161,347	3.5
HYDRAULICS/PNEUMATICS	1,058	9	5,084	1,518			7,669	0.2
BONDING	13,079	81					13,160	0.3
STRIP/FINISH/PAINT	9,827	2,142	4,906	73,544	57,468	11,356	159,243	3.4
WELD	14,432	22,349	3,846	46,435	27,698	6,908	121,668	2.6
MACHINE	412,289	97,211	45,515	333,908	270,155	225,197	1,384,275	29.8
WIRE CUT/MANUFACTURING		8,145	7,546	1,450	112,786		829,927	17.9
FORGE/FOUNDRY	126,646	22,311	3,166	0	35,569	16,118	140,487	3.0
LAYOUT/PATTERN		2,012		146,010	64,310	27,247	302,902	6.5
SHEET METAL	157,305	66,780	25,080	149,537	100,258	107,674	606,634	13.1
CLEAN, ABRASIVE	4,274	2,355	2,876	363	9,229		16,960	0.4
CLEAN, CHEMICAL		3,922		586		20	6,665	0.1
HEAT TREAT	22,043		2,375		48,272	6,907	79,597	1.7
PLATING	8,341	4,837	1,989	25,984	5,352	22,703	69,206	1.5
PACKING/PRESERVATION	5,382	362	2,527	14,846	5,080	1,428	29,625	0.6
CALIBRATION				0	443		443	0.0
TESTING	4,350			7,804	11,281	5,301	28,736	0.6
MISCELLANEOUS								
ARMAMENT	5,690			2,306		1,696	9,692	0.2
BEARINGS	213		127		226,670	72	227,082	4.9
BLADES PROP								
ROTOR					316	4,183	4,499	0.1
CONTROL CABLES			340			11,847	12,187	0.3
EJECTION SEAT				2,075			2,075	0.0
FABRIC/RUBBER/PLASTICS	17,343	9,886	22,171	12,834	0	28,956	91,190	2.0
FLIGHT CONTROLS & SUBASSM.								
FUEL CONTROLS & ACCESSORIES				3,445	0		3,445	0.1
GROUND SUPPORT EQUIPMENT	12,238				188,519		200,757	4.3
LANDING GEAR	2,558	1,626		1,002		454	5,640	0.1
MECHANICAL MODS. & REPAIR								
COMPRESSOR/TURBINE/ENGINE								
METAL REPAIR								
CYLINDER & PISTON								
PROTOTYPE					44,311		44,311	1.0
FIELD SERVICE				33,056			33,056	0.7
HELO. DYNAMIC COMPONENTS								
TOTAL	945,985	245,052	137,750	872,784	1,942,996	499,817	4,644,384	100.0
%	20.4	5.3	3.0	18.8	41.8	10.8	100.0	

FIGURE A-7
TOTAL
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	NAVAIREWORKFAC ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%	COST DRIVER RANKING
EXAMINATION/EVALUATION	1,330,781	560,935	118,187	746,025	782,664	452,925	3,991,517	3.6	8
DISASSEMBLE/ASSEMBLE	2,313,901	2,977,674	974,740	4,559,941	5,438,329	2,235,096	18,499,681	16.7	2
ELECTRICAL/ELECTRONIC	3,630,558	1,935,811	2,384,131	4,494,709	4,876,175	4,817,046	22,138,430	20.0	1
HYDRAULICS/PNEUMATICS	2,280,970	725,743	350,375	603,369	462,297	808,537	5,231,291	4.7	6
BONDING	364,316	160,048	-	-	174,236	194,158	892,758	0.8	21
STRIP/FINISH/PAINT	780,377	488,285	738,419	573,526	1,066,247	806,364	4,453,218	4.0	7
WELD	164,056	107,425	173,923	306,060	171,469	84,209	1,007,142	0.9	19
MACHINE	1,154,751	610,939	654,390	1,397,101	1,704,683	1,177,019	6,698,883	6.0	5
WIRE CUT/MANUFACTURING	237	80,299	48,417	407,839	850,658	-	1,387,450	1.3	15
FORGE/FOUNDRY	77,734	40,774	13,341	0	39,046	62,986	233,881	0.2	30
LAYOUT/PATTERN	77,734	19,507	-	178,634	72,170	159,669	507,714	0.5	27
SHEET METAL	2,270,288	1,438,941	1,268,723	3,705,466	3,629,033	3,010,069	15,322,520	13.8	3
CLEAN, ABRASIVE	186,396	162,719	232,492	367,541	107,376	165,820	1,222,345	1.1	17
CLEAN, CHEMICAL	187,422	286,025	-	333,659	102,880	501,329	1,411,315	1.3	13
HEAT TREAT	46,706	-	20,863	-	306,404	84,209	458,182	0.4	28
PLATING	116,316	140,227	255,187	329,873	175,273	243,972	1,260,848	1.1	16
PACKING/PRESERVATION	525,786	195,820	303,721	330,299	297,615	435,319	2,088,560	1.9	12
CALIBRATION	857,531	167,339	421,587	448,403	1,188,451	331,601	3,414,912	3.1	9
TESTING	1,830,205	382,483	415,885	1,427,790	2,689,841	923,866	7,670,070	6.9	4
MISCELLANEOUS-									
ARMAMENT	526,590	119,761	284,351	983,572	161,327	288,364	2,363,965	2.1	11
BEARINGS	252,436	74,254	53,556	-	226,670	214,134	821,050	0.7	22
BLADES - PROP	-	-	45,391	472,408	-	-	517,799	0.5	26
ROTOR	-	420,278	-	-	434,968	110,912	966,158	0.9	20
CONTROL CABLES	-	-	4,796	-	-	56,775	61,571	0.1	36
EJECTION SEAT	-	-	19,464	206,362	-	-	225,826	0.2	31
FABRIC/RUBBER/PLASTICS	219,158	237,457	111,873	120,014	194,464	198,261	1,081,227	1.0	18
FLIGHT CONTROLS & SUBASSM.	-	-	393,148	-	-	-	393,148	0.4	29
FUEL CONTROLS & ACCESSORIES	-	-	360,354	950,023	96,582	-	1,406,959	1.3	14
GROUND SUPPORT EQUIPMENT	633,239	63,673	287,126	279,131	1,206,910	64,978	2,535,057	2.3	10
LANDING GEAR	154,534	100,447	49,638	99,623	-	218,380	622,622	0.6	25
MECHANICAL MODS. & REPAIR	-	-	76,480	-	-	-	76,480	0.1	34
COMPRESSOR/TURBINE/ENGINE	-	-	211,685	-	-	-	211,685	0.2	32
METAL REPAIR	-	-	84,400	-	-	-	84,400	0.1	33
CYLINDER & PISTON	-	-	-	-	64,580	-	64,580	0.1	35
PROTOTYPE	-	-	-	-	-	-	-	-	-
FIELD SERVICE	-	-	-	375,656	-	258,144	633,800	0.6	24
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	777,403	777,403	0.7	23
TOTAL	19,982,023	11,496,864	10,356,643	23,697,024	26,520,348	18,681,545	110,734,447	100.0	
%	18.0	10.4	9.4	21.4	23.9	16.9	100.0		

FIGURE A-8

NAVAIREWORKFAC ALAMEDA
DIRECT LABOR (DOLLARS)
1 APR 77 - 30 SEP 77

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION		589,592	0	185,638	374,008	158,583	22,960	1,330,781	6.7
DISASSEMBLE/ASSEMBLE		873,716	207,373	1,125,308	37,266	70,139	99	2,313,901	11.6
ELECTRICAL/ELECTRONIC		710,274		20,934	2,726,936	66,556	105,858	3,630,558	18.2
HYDRAULICS/PNEUMATICS		241,376		470,212	1,513,458	54,866	1,058	2,280,970	11.4
BONDING		200,818	194	1,513	128,663	20,049	13,079	364,316	1.8
STRIP/FINISH/PAINT		674,871	1,909	79	70,083	23,608	9,827	780,377	3.9
WELD		91,587	75	1,014	34,077	22,871	14,432	164,056	0.8
MACHINE		39,116	547	419,989	219,113	63,697	412,289	1,154,751	5.8
WIRE CUT/MANUFACTURING ¹			237					237	0.0
FORGE/FOUNDRY		21,770	151		3560	3,341	126,646	155,468	0.8
LAYOUT/PATTERN									
SHEET METAL		1,382,106	25	13,397	307,696	409,759	157,305	2,270,288	11.4
CLEAN, ABRASIVE			72	284	133,738	13,254	4,274	373,819	1.9
CLEAN, CHEMICAL		221,100	1,097						
HEAT TREAT		8,086	0	320	14,909	1,348	22,043	46,706	0.2
PLATING		32,589	278	3,824	63,903	7,381	8,341	116,316	0.6
PACKING/PRESERVATION		1,385	19	32,947	186,626	299,427	5,382	525,786	2.6
CALIBRATION		6	0	0	297,216	560,309		857,531	4.3
TESTING		998,540	582,672	0	122,443	122,200	4,350	1,830,205	9.2
MISCELLANEOUS-									
ARMAMENT		133,395	-	41	375,185	12,279	5,690	526,590	2.6
BEARINGS		7,095	-	47,979	162,113	35,036	213	252,436	1.3
BLADES - PROP		-	-	-	-	-	-	-	-
ROTOR		-	-	-	-	-	-	-	-
CONTROL CABLES		-	-	-	-	-	-	-	-
EJECTION SEAT		-	-	-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS		143,474	-	-	38,213	20,128	17,343	219,158	1.1
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		-	-	-	-	-	-	-	-
GROUND SUPPORT EQUIPMENT		34,622	-	92	532,227	54,060	12,238	638,239	3.2
LANDING GEAR		76,146	-	-	71,571	4,259	2,558	154,534	0.8
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-	-	-
PROTOTYPE		-	-	-	-	-	-	-	-
FIELD SERVICE		-	-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-	-
TOTAL		6,481,664	794,649	2,323,571	7,413,004	2,023,150	945,985	19,982,023	100.0
		32.4	4.0	11.6	37.1	10.1	4.7	100.0	

NOTES:

¹INCLUDED IN ELECTRICAL/ELECTRONIC

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION		218,551	66,687	250,987	24,476	234	560,935	4.9
DISASSEMBLE/ASSEMBLE		1,630,160	730,067	419,030	198,362	55	2,977,674	25.9
ELECTRICAL/ELECTRONIC		885,376	26,701	894,593	128,406	735	1,935,811	16.8
HYDRAULICS/PNEUMATICS		58,028	174,266	466,791	26,649	9	725,743	6.3
BONDING		1,557	-	157,879	531	81	160,048	1.4
STRIP/FINISH/PAINT		297,037	42,829	131,022	15,255	2,142	488,285	4.2
WELD		5,388	36,780	40,378	2,530	22,349	107,425	0.9
MACHINE		76,422	146,834	253,976	36,496	97,211	610,939	5.3
WIRE CUT/MANUFACTURING		28,002	10,131	14,345	19,676	8,145	80,299	0.7
FORGE/FOUNDRY		4,192	3,626	8,592	2,053	22,311	40,774	0.4
LAYOUT/PATTERN		9,421	155	7,210	709	2,012	19,507	0.2
SHEET METAL		751,683	114,021	389,336	117,121	66,780	1,438,941	12.5
CLEAN, ABRASIVE		9,372	40,632	105,111	5,249	2,355	162,719	1.4
CLEAN, CHEMICAL		111,136	44,286	118,332	8,349	3,922	286,025	2.5
HEAT TREAT ¹								
PLATING		14,023	23,557	95,573	2,237	4,837	140,227	1.2
PACKING/PRESERVATION		6,140	45,037	132,703	11,578	362	195,820	1.7
CALIBRATION		129	-	24,726	142,484	-	167,339	1.5
TESTING		13,651	204,576	149,929	14,327	-	382,483	3.3
MISCELLANEOUS-								
ARMAMENT		41,755	-	39,878	38,128	-	119,761	1.0
BEARINGS		1,635	24,606	46,474	1,539	-	74,254	0.6
BLADES - PROP		-	-	-	-	-	-	-
ROTOR		7,980	-	407,161	5,137	-	420,278	3.7
CONTROL CABLES		-	-	-	-	-	-	-
EJECTION SEAT		-	-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS		158,263	3,585	52,989	12,734	9,886	237,457	2.1
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		-	-	-	-	-	-	-
GROUND SUPPORT EQUIPMENT		134	-	59,548	3,991	-	63,673	0.6
LANDING GEAR		16,517	-	77,198	5,106	1,626	100,447	0.9
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-	-
PROTOTYPE		-	-	-	-	-	-	-
FIELD SERVICE		-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-
TOTAL		4,346,552	1,738,376	4,343,761	823,123	245,052	11,496,864	100.0
%		37.8	15.1	37.8	7.2	2.1	100.0	

FIGURE A-9

NAVAIREWORKFAC CHERRY POINT
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

NOTES:

¹ INCLUDED IN SHEET METAL/WELD/FORGE/FOUNDRY

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION		15,642	60,399	35,996	5,207	943	118,187	1.1
DISASSEMBLE/ASSEMBLE		436,763	485,396	8,036	44,545		974,740	9.4
ELECTRICAL/ELECTRONIC		488,462	48,835	1,709,887	127,688	9,259	2,384,131	23.0
HYDRAULICS/PNEUMATICS ¹		85,751	14,478	224,488	20,574	5,084	350,375	3.4
BONDING ²								
STRIP/FINISH/PAINT		465,529	51,446	137,194	79,344	4,906	738,419	7.1
WELD		12,197	101,119	44,720	12,041	3,846	173,923	1.7
MACHINE		81,849	273,250	225,000	28,776	45,515	654,390	6.3
WIRE CUT/MANUFACTURING		12,771	1,661	24,473	1,966	7,546	48,417	0.5
FORGE/FOUNDRY		2,697	3,330	2,818	1,330	3,166	13,341	0.1
LAYOUT/PATTERN ³								
SHEET METAL		764,955	10,555	271,562	196,571	25,080	1,268,723	12.3
CLEAN, ABRASIVE		29,403	95,582	90,158	14,473	2,676	232,492	2.2
CLEAN, CHEMICAL ⁴								
HEAT TREAT		2,654	9,957	5,254	613	2,375	20,863	0.2
PLATING		19,955	128,831	100,297	4,115	1,989	255,187	2.5
PACKING/PRESERVATION		15,692	35,618	170,796	79,088	2,527	303,721	2.9
CALIBRATION		97	88	162,161	259,241		421,587	4.1
TESTING		245,410	125,767	250	43,458		415,885	4.0
MISCELLANEOUS-								
ARMAMENT		29,704		193,131	61,516		284,351	2.7
BEARINGS		7,996	9,812	30,076	5,545	127	53,556	0.5
BLADES - PROP		1,071		43,875	445		45,391	0.4
ROTOR								
CONTROL CABLES		954		3,238	264	340	4,796	0.0
EJECTION SEAT		15,490		2,534	1,440		19,464	0.2
FABRIC/RUBBER/PLASTICS		43,375	3,423	31,754	11,150	22,171	111,873	1.1
FLIGHT CONTROLS & SUBASSM.		377,644	28	5,385	10,091		393,148	3.8
FUEL CONTROLS & ACCESSORIES		4,356	178,424	163,874	13,700		360,354	3.5
GROUND SUPPORT EQUIPMENT		2,337		210,321	74,468		287,126	2.8
LANDING GEAR		21,098		26,832	1,708		49,638	0.5
MECHANICAL MODS. & REPAIR		416			76,064		76,480	0.7
COMPRESSOR/TURBINE/ENGINE		152	166,392	41,887	3,254		211,685	2.0
METAL REPAIR								
CYLINDER & PISTON			53,549	29,329	1,522		84,400	0.8
PROTOTYPE								
FIELD SERVICE								
HELO. DYNAMIC COMPONENTS								
TOTAL		3,185,430	1,857,940	3,995,326	1,180,197	137,750	10,356,643	100.0
%		30.8	17.9	38.6	11.4	1.3	100.0	

FIGURE A-10

NAVAIREWORKFAC JACKSONVILLE
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

NOTES:

¹ NO PNEUMATICS² INCLUDED IN PLASTICS³ INCLUDED IN SHEET METAL⁴ INCLUDED ELSEWHERE

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION		352,908	39,022	267,638	24,073	62,384	-	746,025	3.1
DISASSEMBLE/ASSEMBLE		3,303,271	0	960,709	135,332	160,521	108	4,559,941	19.2
ELECTRICAL/ELECTRONIC		1,632,044	122,854	26,894	2,171,802	525,142	15,973	4,494,709	19.0
HYDRAULICS/PNEUMATICS		199,651	0	74,609	281,278	46,313	1,518	603,369	2.5
BONDING ¹									
STRIP/FINISH/PAINT		350,587	26,722	9,155	59,888	53,630	73,544	573,526	2.4
WELD		24,161	109	120,899	76,234	38,222	46,435	360,060	1.3
MACHINE		177,147	1,775	456,875	221,960	205,436	333,908	1,397,101	5.9
WIRE CUT/MANUFACTURING		148,088	11,147	2,440	197,064	47,650	1,450	407,839	1.7
FORGE/FOUNDRY ²		0	0	0	0	0	0	0	0.0
LAYOUT/PATTERN		5,072	-	67	887	26,598	146,010	178,634	0.8
SHEET METAL		2,805,798	368	1,848	170,253	577,662	149,537	3,705,466	15.6
CLEAN, ABRASIVE		137,365	6,846	133,074	66,040	23,853	363	367,541	1.6
CLEAN, CHEMICAL		217,108	11,059	36,977	42,375	25,554	586	333,659	1.4
HEAT TREAT ²									
PLATING		56,603	9,063	73,154	130,832	24,237	25,984	329,873	1.4
PACKING/PRESERVATION		27,384	-	1,270	90,697	196,102	14,846	330,299	1.4
CALIBRATION		114	111	40	155,908	292,230	0	448,403	1.9
TESTING		586,215	133,440	254,172	294,037	152,122	7,804	1,427,790	6.0
MISCELLANEOUS-									
ARMAMENT		273,025	470,199	36,972	142,264	58,806	2,306	983,572	4.2
BEARINGS		-	-	-	-	-	-	-	-
BLADES - PROP		13,410	1	219,864	190,313	48,820	-	472,408	2.0
ROTOR		-	-	-	-	-	-	-	-
CONTROL CABLES		-	-	-	-	-	-	-	-
EJECTION SEAT		64,829	-	9,029	101,186	29,243	2,075	206,362	0.9
FABRIC/RUBBER/PLASTICS		61,407	-	585	38,053	7,135	12,834	120,014	0.5
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		409,318	-	190,959	262,395	83,906	3,445	950,023	4.0
GROUND SUPPORT EQUIPMENT		981	-	130	277,176	844	-	279,131	1.2
LANDING GEAR		31,297	-	4,359	48,848	14,117	1,002	99,623	0.4
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-	-	-
PROTOTYPE		-	-	-	-	-	-	-	-
FIELD SERVICE		4,000	-	306	158,496	179,798	33,056	375,656	1.6
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-	-
TOTAL		10,891,783	832,716	2,882,025	5,337,391	2,880,325	872,784	23,697,024	100.0
%		46.0	3.5	12.2	22.5	12.2	3.7	100.0	

FIGURE A-11
NAVAIREWORKFAC NORFOLK
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

NOTES: ¹INCLUDED IN PLASTICS
²INCLUDED IN MACHINE

FIGURE A-12

NAVAIREWORKFAC NORTH ISLAND
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77
(FACTORED FROM 1 JUL 77 - 1 JUL 78 DATA)

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION		546,341	85,138	52,626	97,679	880	782,664	3.0
DISASSEMBLE/ASSEMBLE		4,723,373	255,324	145,332	298,017	16,288	5,438,329	20.5
ELECTRICAL/ELECTRONIC		2,663,134	385,599	1,500,405	308,926	18,111	4,876,175	18.4
HYDRAULICS/PNEUMATICS		104,798	-	357,499	-	-	462,297	1.7
BONDING		14	52	173,946	224	-	174,236	0.7
STRIP/FINISH/PAINT		739,598	60,084	143,386	65,711	57,468	1,066,247	4.0
WELD		11,627	76,927	40,878	14,339	27,698	171,469	0.6
MACHINE		596,403	246,757	501,899	89,469	270,155	1,701,683	6.4
WIRE CUT/MANUFACTURING		12,043	69	8,738	17,272	812,786	850,658	3.2
FORGE/FOUNDRY		170	-	128	3,179	35,569	39,046	0.1
LAYOUT/PATTERN		3,970	-	403	3,487	64,310	72,170	0.3
SHEET METAL		3,047,283	99,841	202,824	178,827	100,258	3,629,033	13.7
CLEAN, ABRASIVE		25,761	10,466	55,575	6,345	9,229	107,376	0.4
CLEAN, CHEMICAL		932	77,216	22,847	1,885	-	102,880	0.4
HEAT TREAT		-	3,553	177,120	7,459	48,272	306,404	1.2
PLATING		-	21,568	142,772	5,581	5,352	175,273	0.7
PACKING/PRESERVATION		40,217	109	54,054	198,155	5,080	297,615	1.1
CALIBRATION		97,489	-	579,590	510,929	443	1,188,451	4.5
TESTING		2,148,102	126,213	114,247	289,998	11,281	2,689,841	10.1
MISCELLANEOUS-								
ARMAMENT		94,642	1,231	62,003	3,451	-	161,327	0.6
BEARINGS		-	-	-	-	226,670	226,670	0.9
BLADES - PROP		-	-	-	-	-	-	-
ROTOR		55,663	808	373,895	4,286	316	434,968	1.6
CONTROL CABLES		-	-	-	-	-	-	-
EJECTION SEAT		-	-	-	-	-	194,464	0.7
FABRIC/RUBBER/PLASTICS		191,399	3,065	-	-	-	-	-
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	96,582	0.4
FUEL CONTROLS & ACCESSORIES		3,923	55,664	31,927	5,068	-	1,206,910	4.6
GROUND SUPPORT EQUIPMENT		283,866	-	336,156	398,369	188,519	-	-
LANDING GEAR		-	-	-	-	-	-	-
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-	-
PROTOTYPE		3,874	24	1,425	14,946	44,311	64,580	0.2
FIELD SERVICE		-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-
TOTAL		15,394,622	1,579,708	5,079,425	2,523,597	1,942,996	26,520,348	100.0
%		58.0	6.0	19.2	9.5	7.3	100.0	

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION		396,999	24,743	31,183	-	452,925	2.4
DISASSEMBLE/ASSEMBLE		1,986,150	168,806	69,801	10,339	2,235,096	12.0
ELECTRICAL/ELECTRONIC		1,359,509	2,929,895	516,231	11,411	4,817,046	25.8
HYDRAULICS/PNEUMATICS		82,976	699,479	26,082	-	808,537	4.3
BONDING		191,712	2,389	57	-	194,158	1.0
STRIP/FINISH/PAINT		581,799	152,243	60,966	11,356	806,364	4.3
WELD		24,453	42,840	10,008	6,908	84,209	0.5
MACHINE		229,819	560,062	161,941	225,197	1,177,019	6.3
WIRE CUT/MANUFACTURING ¹							
FORGE/FOUNDRY		2,609	6,330	37,929	16,118	62,986	0.3
LAYOUT/PATTERN		14,915	2,214	115,293	27,247	159,669	0.9
SHEET METAL		2,436,441	90,912	375,042	107,674	3,010,069	16.1
CLEAN, ABRASIVE		2,981	162,334	505	-	165,820	0.9
CLEAN, CHEMICAL		478,696	5,209	17,404	20	501,329	2.7
HEAT TREAT		24,454	42,841	10,007	6,907	84,209	0.5
PLATING		71,451	130,086	19,732	22,703	243,972	1.3
PACKING/PRESERVATION		125,410	117,544	190,937	1,428	435,319	2.3
CALIBRATION		78	163,377	168,146	-	331,601	1.8
TESTING		790,602	79,584	48,379	5,301	923,866	4.9
MISCELLANEOUS--							
ARMAMENT		184,924	78,895	22,831	1,696	288,364	1.5
BEARINGS		27,331	182,353	4,378	72	214,134	1.1
BLADES - PROP		-	-	-	-	-	-
ROTOR		63,616	39,881	3,232	4,183	110,912	0.6
CONTROL CABLES		25,748	13,296	5,884	11,847	56,775	0.3
EJECTION SEAT		-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS		121,482	25,572	22,251	28,956	198,261	1.1
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		-	-	-	-	-	-
GROUND SUPPORT EQUIPMENT		2,260	55,147	7,571	-	64,978	0.3
LANDING GEAR		129,592	84,492	3,842	454	218,380	1.2
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-
PROTOTYPE		-	-	-	-	-	-
FIELD SERVICE		974	154	257,016	-	258,144	1.4
HELO. DYNAMIC COMPONENTS		18,523	729,689	29,191	-	777,403	4.2
TOTAL		9,375,522	6,590,367	2,215,839	499,817	18,681,545	100.0
%		50.2	35.3	11.9	2.7	100.0	

FIGURE A-13
 NAVAIREWORKFAC PENSACOLA
 DIRECT LABOR (DOLLARS)
 1 JAN 78 - 30 JUN 78
 (FACTORED FROM 1 JAN 78 - 10 JUN 78 DATA)

NOTES: ¹INCLUDED IN ELECTRICAL/ELECTRONIC

FIGURE A-14
TOTAL
DIRECT LABOR (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%	COST DRIVER RANKING
EXAMINATION/EVALUATION		2,120,033	39,022	665,500	762,433	379,512	25,017	3,991,517	3.6	8
DISASSEMBLE/ASSEMBLE		12,952,433	207,373	3,556,804	913,802	841,380	26,889	18,499,531	16.7	2
ELECTRICAL/ELECTRONIC		7,738,799	122,854	508,963	11,933,518	1,672,949	161,347	22,138,430	20.0	1
HYDRAULICS/PNEUMATICS		772,580	0	733,565	3,542,993	174,484	7,669	5,231,291	4.7	6
BONDING		394,101	194	1,565	462,877	20,861	13,160	892,758	0.8	21
STRIP/FINISH/PAINT		3,109,421	28,631	163,593	693,816	298,514	159,243	4,453,218	4.0	7
WELD		169,413	184	336,739	279,127	100,011	121,668	1,007,142	0.9	19
MACHINE		1,200,756	2,322	1,543,705	1,982,010	585,815	1,384,275	6,698,883	6.0	5
WIRE CUT/MANUFACTURING		200,904	11,384	14,301	244,370	86,564	829,927	1,387,450	1.3	15
FORGE/FOUNDRY		20,553	75	6,956	19,648	46,162	140,487	233,881	0.2	30
LAYOUT/PATTERN		44,263	76	222	12,494	147,757	302,902	507,714	0.5	27
SHEET METAL		11,188,266	393	239,662	1,432,583	1,854,982	606,634	15,322,520	13.8	3
CLEAN, ABRASIVE		315,432	6,918	279,896	546,087	57,052	16,960	1,222,345	1.1	17
CLEAN, CHEMICAL		918,422	12,156	158,621	255,632	59,819	6,665	1,411,315	1.3	13
HEAT TREAT		35,204	0	83,830	240,124	19,427	79,597	458,182	0.4	28
PLATING		204,621	9,341	250,934	663,463	63,283	69,206	1,260,848	1.1	16
PACKING/PRESERVATION		216,228	19	114,981	752,420	975,287	29,625	2,088,560	1.9	12
CALIBRATION		97,913	111	128	1,382,978	1,933,339	443	3,414,912	3.1	9
TESTING		4,783,520	716,112	710,728	760,490	670,484	28,736	7,670,070	6.9	4
MISCELLANEOUS--										
ARMAMENT		757,463	470,199	38,244	891,356	197,011	9,692	2,363,965	2.1	11
BEARINGS		44,057		82,397	421,016	46,498	227,082	821,050	0.7	22
BLADES - PROP		14,481	1	219,864	234,188	49,265		517,799	0.5	26
ROTOR		127,259		808	820,937	12,655	4,499	966,158	0.9	20
CONTROL CABLES		26,702			16,534	6,148	12,187	61,571	0.1	36
EJECTION SEAT		80,319		9,029	103,720	30,683	2,075	225,826	0.2	31
FABRIC/RUBBER/PLASTICS		719,400		10,658	186,581	73,398	91,190	1,081,227	1.0	18
FLIGHT CONTROLS & SUBASSM.		377,644		28	5,385	10,091		393,148	0.4	29
FUEL CONTROLS & ACCESSORIES		417,597		425,047	458,196	102,674	3,445	1,406,959	1.3	14
GROUND SUPPORT EQUIPMENT		324,200		222	1,470,575	539,303	200,757	2,535,057	2.3	10
LANDING GEAR		274,650		4,359	308,941	29,032	5,640	622,622	0.6	25
MECHANICAL MODS. & REPAIR		416				76,064		76,480	0.1	34
COMPRESSOR/TURBINE/ENGINE		152		166,392	41,887	3,254		211,685	0.2	32
METAL REPAIR				53,549	29,329	1,522		84,400	0.1	33
CYLINDER & PISTON				24	1,425	14,946	44,311	64,580	0.1	35
PROTOTYPE		3,874		306	158,650	436,814	33,056	633,800	0.6	24
FIELD SERVICE		4,974			729,689	29,191		777,403	0.7	23
HELO. DYNAMIC COMPONENTS		18,523								
TOTAL		48,675,573	1,627,365	10,381,620	32,759,274	11,646,231	4,644,384	110,734,447	100.0	
%		44.9	1.5	9.4	29.6	10.5	4.2	100.0		

MT FUNCTIONAL CATEGORY	NAVAIREWORKFAC ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	(24,305)	12,189	468	25,600	-	-	13,952	0.1
DISASSEMBLE/ASSEMBLE	118,084	144,218	158,347	568,112	840,008	1,144,152	2,972,921	16.7
ELECTRICAL/ELECTRONIC	166,502	133,350	210,158	371,466	1,563,176	165,258	2,609,910	14.6
HYDRAULICS/PNEUMATICS	141,216	21,060	90,970	320,934	555,015	283,410	1,412,605	7.9
BONDING	91,786	568	-	-	32	3,081	95,467	0.5
STRIP/FINISH/PAINT	12,946	107,571	6,340	10,076	717	226,119	363,769	2.0
WELD	147,117	1,773	25,836	5,272	4,250	52,462	236,711	1.3
MACHINE	2,548	26,257	4,239	64,220	393,196	15,993	506,453	2.8
WIRE CUT/MANUFACTURING	-	10,036	11,942	62,676	45,035	-	129,689	0.7
FORGE/FOUNDRY	608	1,529	95	-	-	-	2,232	0.0
LAYOUT/PATTERN	609	3,436	-	2,240	23	2,376	8,684	0.0
SHEET METAL	356,746	136,176	283,111	389,806	1,195,396	607,738	2,968,973	16.6
CLEAN, ABRASIVE	131	2,857	-	1,652	5,242	-	9,882	0.1
CLEAN, CHEMICAL	132	39,879	-	-	-	-	40,011	0.2
HEAT TREAT	631	-	2	-	16,870	-	17,503	0.1
PLATING	33	4,815	2	13,574	-	-	18,424	0.1
PACKING/PRESERVATION	0	1,249	15	-	2,786	361	4,411	0.0
CALIBRATION	0	46	-	1,798	158,463	273	160,580	0.9
TESTING	220,699	2,955	66,796	99,968	383,002	314,728	1,088,148	6.1
MISCELLANEOUS-								
ARMAMENT	36,467	14,965	9,106	24,492	289,794	392,124	766,948	4.3
BEARINGS	23,271	333	26,220	-	-	104,890	154,714	0.9
BLADES - PROP	-	-	-	25,362	-	-	25,362	0.1
ROTOR	-	2,911	-	-	173,118	298,395	474,424	2.7
CONTROL CABLES	-	-	5	-	-	43,214	43,219	0.2
EJECTION SEAT	-	-	10,101	69,356	-	-	79,457	0.4
FABRIC/RUBBER/PLASTICS	43,373	57,723	36,739	24,448	606,970	221,991	991,244	5.6
FLIGHT CONTROLS & SUBASSM.	-	-	123,159	-	-	-	123,159	0.7
FUEL CONTROLS & ACCESSORIES	-	-	3,484	187,878	21,554	-	212,916	1.2
GROUND SUPPORT EQUIPMENT	17,839	49	172	654	865,578	2,340	886,632	5.0
LANDING GEAR	174,267	6,024	138,766	164,988	-	564,387	1,048,432	5.9
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	-	-	-	-	-	-
METAL REPAIR	-	-	-	-	-	-	-	-
CYLINDER & PISTON	-	-	-	-	-	-	-	-
PROTOTYPE	-	-	-	-	347	-	347	0.0
FIELD SERVICE	-	-	-	-	-	70	70	0.0
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	369,644	369,644	2.1
TOTAL	1,530,701	731,969	1,206,073	2,434,572	7,120,572	4,813,006	17,836,893	100.0
%	8.6	4.1	6.8	13.6	39.9	27.0	100.0	

FIGURE A-15
AIRCRAFT REWORK
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	NAVAIREWORKFAC ALAMEDA	NORFOLK	TOTAL	%
EXAMINATION/EVALUATION	0	-	-	-
DISASSEMBLE/ASSEMBLE	25,826	-	25,826	1.6
ELECTRICAL/ELECTRONIC	-	190,672	190,672	11.5
HYDRAULICS/PNEUMATICS	-	-	-	-
BONDING	0	-	-	-
STRIP/FINISH/PAINT	0	-	-	-
WELD	0	-	-	-
MACHINE	0	-	-	-
WIRE CUT/MANUFACTURING	14	41,802	41,816	2.5
FORGE/FOUNDRY	0	-	-	-
LAYOUT/PATTERN	0	-	-	-
SHEET METAL	0	-	-	-
CLEAN, ABRASIVE	0	-	-	-
CLEAN, CHEMICAL	0	-	-	-
HEAT TREAT	0	-	-	-
PLATING	0	968	968	0.1
PACKING/PRESERVATION	0	-	-	-
CALIBRATION	0	146	146	0.0
TESTING	48,748	5,096	53,844	3.3
MISCELLANEOUS-				
ARMAMENT	-	1,342,924	1,342,924	81.1
BEARINGS	-	-	-	-
BLADES - PROP	-	-	-	-
ROTOR	-	-	-	-
CONTROL CABLES	-	-	-	-
EJECTION SEAT	-	-	-	-
FABRIC/RUBBER/PLASTICS	-	-	-	-
FLIGHT CONTROLS & SUBASSM.	-	-	-	-
FUEL CONTROLS & ACCESSORIES	-	-	-	-
GROUND SUPPORT EQUIPMENT	-	-	-	-
LANDING GEAR	-	-	-	-
MECHANICAL MODS. & REPAIR	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	-	-
METAL REPAIR	-	-	-	-
CYLINDER & PISTON	-	-	-	-
PROTOTYPE	-	-	-	-
FIELD SERVICE	-	-	-	-
HELO. DYNAMIC COMPONENTS	-	-	-	-
TOTAL	74,588	1,581,608	1,656,196	100.0
%	4.5	95.5	100.0	

FIGURE A-16
MISSILE REWORK
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

FIGURE A-17
ENGINE REWORK
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77
FIGURE A-23

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	495	19,905	174	766,868	-	-	787,442	3.4
DISASSEMBLE/ASSEMBLE	1,240,599	2,535,514	1,343,384	2,940,172	456,427	-	8,526,096	36.3
ELECTRICAL/ELECTRONIC	25,928	74,385	17,514	76,916	111,163	-	305,886	1.3
HYDRAULICS/PNEUMATICS	805,616	485,462	93,287	354,250	-	-	1,738,615	7.4
BONDING	-	-	-	-	-	-	-	-
STRIP/FINISH/PAINT	-	146,692	5,332	-	-	-	152,024	0.6
WELD	-	126,502	18,580	43,698	29,297	-	218,077	0.9
MACHINE	61,134	479,969	92,057	20,456	650,186	-	1,303,802	5.6
WIRE CUT/MANUFACTURING	-	28,217	20,964	2,308	408	-	51,897	0.2
FORGE/FOUNDRY	-	10,734	-	-	-	-	10,734	0.0
LAYOUT/PATTERN	-	459	-	-	-	-	459	0.0
SHEET METAL	4,978	385,010	5,908	-	101,696	-	497,592	2.1
CLEAN, ABRASIVE	-	134,152	5,037	-	5,244	-	144,433	0.6
CLEAN, CHEMICAL	-	148,885	-	-	2,372	-	151,257	0.6
HEAT TREAT	-	-	9	-	1,190,758	-	1,190,767	5.1
PLATING	-	80,142	204	18,800	-	-	99,146	0.4
PACKING/PRESERVATION	-	157,261	51,673	-	44	-	208,978	0.9
CALIBRATION	2,210	-	-	-	-	-	2,210	0.0
TESTING	6	654,183	360,863	21,684	249,713	-	1,286,449	5.5
MISCELLANEOUS-	-	-	-	2,012	46,236	-	48,248	0.2
ARMAMENT	-	-	-	-	-	-	-	-
BEARINGS	446,605	85,921	92,709	-	-	-	625,235	2.7
BLADES - PROP	-	-	-	11,952	-	-	11,952	0.1
ROTOR	-	-	-	-	30,545	-	30,545	0.1
CONTROL CABLES	-	-	-	-	-	-	-	-
EJECTION SEAT	-	-	-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS	-	10,611	174	-	115,143	-	125,928	0.5
FLIGHT CONTROLS & SUBASSM.	-	-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES	-	-	399,015	1,143,174	192,866	-	1,735,055	7.4
GROUND SUPPORT EQUIPMENT	70	-	-	-	259,333	-	259,403	1.1
LANDING GEAR	-	-	-	-	-	-	-	-
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	3,247,192	-	-	-	3,247,192	13.8
METAL REPAIR	-	-	-	-	-	-	-	-
CYLINDER & PISTON	-	-	730,047	-	-	-	730,047	3.1
PROTOTYPE	-	-	-	-	-	-	-	-
FIELD SERVICE	-	-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	-	-	-
TOTAL	2,587,641	5,563,984	6,484,123	5,402,290	3,451,431	-	23,489,469	100.0
%	11.0	23.7	27.6	23.0	14.7	-	100.0	-

NO ENGINE REWORK

FIGURE A-18

COMPONENT F/E MATERIAL
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	60,802	170,521	-	33,870	-	-	265,193	0.5
DISASSEMBLE/ASSEMBLE	38,218	1,096,101	717	768,118	438,590	183,263	2,525,007	4.7
ELECTRICAL/ELECTRONIC	1,625,652	1,880,941	2,743,701	1,541,276	2,847,542	2,600,072	13,239,184	24.4
HYDRAULICS/PNEUMATICS	2,975,811	942,196	669,661	434,652	1,909,851	2,381,568	9,313,739	17.2
BONDING	27,311	261,563	-	-	219,942	513	509,329	0.9
STRIP/FINISH/PAINT	1,086	261,959	192	1,410	7	1,108	265,762	0.5
WELD	16,832	95,054	16,812	4,992	48,160	12,944	194,794	0.4
MACHINE	10,899	524,149	7,484	66,786	1,703,553	2,497,154	4,810,025	8.9
WIRE CUT/MANUFACTURING	-	30,173	28,753	28,746	45,419	-	133,091	0.2
FORGE/FOUNDRY	359	14,234	2,785	-	32	-	17,410	0.0
LAYOUT/PATTERN	359	11,945	-	-	-	61	12,365	0.0
SHEET METAL	242,892	721,624	184,417	203,448	484,710	175,478	2,012,569	3.7
CLEAN, ABRASIVE	535	234,666	-	23,838	14,600	-	273,639	0.5
CLEAN, CHEMICAL	535	241,416	-	-	3,305	-	245,256	0.5
HEAT TREAT	28,990	-	-	-	224,641	-	253,631	0.5
PLATING	0	156,481	-	31,262	216	-	187,959	0.3
PACKING/PRESERVATION	291,113	350,402	-	-	-	54,646	696,161	1.3
CALIBRATION	75,663	52,009	154,643	165,810	950,316	135,302	1,533,743	2.8
TESTING	93,662	383,717	-	49,446	236,335	1,699	764,859	1.4
MISCELLANEOUS-								
ARMAMENT	631,357	83,880	302,397	154,896	299,320	125,703	1,597,553	2.9
BEARINGS	239,326	122,714	181,680	-	-	1,130,201	1,673,921	3.1
BLADES - PROP	-	-	52,426	201,380	-	-	253,806	0.5
ROTOR	-	674,557	-	-	2,704,724	48,707	3,427,988	6.3
CONTROL CABLES	-	-	197	-	-	22,476	22,673	0.0
EJECTION SEAT	-	-	8,063	44,076	-	-	52,139	0.1
FABRIC/RUBBER/PLASTICS	4,913	69,411	73,034	25,554	-	12,661	185,573	0.3
FLIGHT CONTROLS & SUBASSM.	-	-	23,233	-	-	-	23,233	0.0
FUEL CONTROLS & ACCESSORIES	-	-	564,557	355,402	188,727	-	1,218,686	2.2
GROUND SUPPORT EQUIPMENT	488,950	98,654	18,545	237,964	782,389	81,894	1,708,396	3.1
LANDING GEAR	226,789	127,896	190,954	74,092	-	480,221	1,101,952	2.0
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	891,603	-	-	-	891,603	1.6
METAL REPAIR	-	-	296,685	-	-	-	296,685	0.5
CYLINDER & PISTON	-	-	-	-	132	-	132	0.0
PROTOTYPE	-	-	-	-	-	-	-	-
FIELD SERVICE	-	-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	4,568,805	4,568,805	8.4
TOTAL	7,084,054	8,606,263	6,512,539	4,457,018	13,102,511	14,514,476	54,276,861	100.0
%	13.1	15.9	12.0	8.2	24.1	26.7	100.0	

FIGURE A-19
OTHER SUPPORT
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	27,512	103,946	(34)	2,934	39,590	-	173,948	2.9
DISASSEMBLE/ASSEMBLE	3,242	33,797	10,806	32,006	199,222	7,424	286,497	4.7
ELECTRICAL/ELECTRONIC	42,145	22,800	22,900	225,850	313,472	356,076	983,243	16.3
HYDRAULICS/PNEUMATICS	17,223	3,899	12,845	48,784	44,633	15,713	143,097	2.4
BONDING	2,697	-	-	-	63	-	2,760	0.0
STRIP/FINISH/PAINT	36	228	6,533	4,116	-	4,756	15,669	0.3
WELD	47	21	8,245	7,700	27,183	962	44,158	0.7
MACHINE	1,150	1,193	4,267	21,156	117,121	33,693	178,580	3.0
WIRE CUT/MANUFACTURING	-	3,144	1,251	250,388	54,703	-	309,486	5.1
FORGE/FOUNDRY	315	-	190	-	12	-	517	0.0
LAYOUT/PATTERN	315	-	-	-	3	24,078	24,396	0.4
SHEET METAL	42,688	16,332	22,642	416,844	121,350	191,649	811,505	13.4
CLEAN, ABRASIVE	0	399	-	-	2,375	-	2,774	0.0
CLEAN, CHEMICAL	-	654	-	60,808	-	-	61,462	1.0
HEAT TREAT	0	-	-	-	6,596	-	6,596	0.1
PLATING	18	9	-	6,738	10	-	6,775	0.1
PACKING/PRESERVATION	22,503	899	151,261	-	294,908	171	469,742	7.8
CALIBRATION	190,019	22,708	66,546	32,830	464,781	26,853	803,737	13.3
TESTING	25,748	1,334	22,043	45,586	324,409	12,433	431,553	7.1
MISCELLANEOUS-								
ARMAMENT	343	6,093	251,941	71,062	6,848	5,483	341,770	5.7
BEARINGS	634	120	3,992	-	-	2,215	6,961	0.1
BLADES - PROP	-	-	-	-	-	-	-	-
ROTOR	-	-	-	-	8,190	393	8,583	0.1
CONTROL CABLES	-	-	39	-	-	4,454	4,493	0.1
EJECTION SEAT	-	-	481	49,230	-	-	49,711	0.8
FABRIC/RUBBER/PLASTICS	4,891	-	2,565	2,854	-	16,916	27,226	0.5
FLIGHT CONTROLS & SUBASSM.	-	-	2,381	-	-	-	2,381	0.0
FUEL CONTROLS & ACCESSORIES	-	-	1,265	228,502	18,147	-	247,914	4.1
GROUND SUPPORT EQUIPMENT	7,625	-	43,781	3,688	466,603	9,817	531,514	8.8
LANDING GEAR	652	-	226	6,792	-	10,984	18,654	0.3
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	39,567	-	-	-	39,567	0.7
METAL REPAIR	-	-	-	-	-	-	-	-
CYLINDER & PISTON	-	-	-	-	-	-	-	-
PROTOTYPE	-	-	-	-	583	-	583	0.0
FIELD SERVICE	-	-	-	-	-	3,540	3,540	0.1
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	3,983	3,983	0.1
TOTAL	389,803	217,576	675,733	1,517,868	2,510,802	731,593	6,043,375	100.0
%	6.5	3.6	11.2	25.1	41.5	12.1	100.0	

FIGURE A-20
MANUFACTURING
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	314,601	32	119	-	-	-	314,752	6.9
DISASSEMBLE/ASSEMBLE	24	80	23	-	58,117	1,603	59,847	1.3
ELECTRICAL/ELECTRONIC	7,406	419	2,541	100	88,978	29,943	129,387	2.8
HYDRAULICS/PNEUMATICS	281	-	4,265	10	559	2,339	7,453	0.2
BONDING	1,218	6	-	-	601	-	1,825	0.0
STRIP/FINISH/PAINT	0	150	6	177,556	6	101	177,819	3.9
WELD	20	1,581	120	73,106	3,913	-	78,740	1.7
MACHINE	20,665	6,860	22,805	155,284	187,056	38,472	431,142	9.4
WIRE CUT/MANUFACTURING	-	387	23,483	102,646	2,595,931	-	2,722,447	59.6
FORGE/FOUNDRY	1,745	1,581	-	-	13,294	31	16,651	0.4
LAYOUT/PATTERN	1,745	143	-	4,452	6,601	1,315	14,256	0.3
SHEET METAL	27,944	4,760	17,295	135,400	208,769	32,535	426,703	9.3
CLEAN, ABRASIVE	0	164	-	-	4	-	168	0.0
CLEAN, CHEMICAL	0	278	-	14,016	-	-	14,294	0.3
HEAT TREAT	42	-	14	-	24	-	80	0.0
PLATING	0	333	-	4,760	-	-	5,093	0.1
PACKING/PRESERVATION	577	-	28,986	-	149	-	29,712	0.7
CALIBRATION	-	-	-	210	1,788	-	1,998	0.0
TESTING	606	-	-	3,764	26,182	-	30,552	0.7
MISCELLANEOUS-								
ARMAMENT	0	-	-	14,906	-	-	14,906	0.3
BEARINGS	3,329	-	703	-	-	673	4,705	0.1
BLADES - PROP	-	-	-	-	-	-	-	-
ROTOR	-	-	-	-	111	1,266	1,377	0.0
CONTROL CABLES	-	-	75	-	-	11,489	11,564	0.3
EJECTION SEAT	-	-	-	28,450	-	-	28,450	0.6
FABRIC/RUBBER/PLASTICS	3,117	701	9,381	11,818	-	2,246	27,263	0.6
FLIGHT CONTROLS & SUBASM.	-	-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES	-	-	-	2	159	-	161	0.0
GROUND SUPPORT EQUIPMENT	0	-	-	-	-	12	12	0.0
LANDING GEAR	244	115	-	-	-	46	405	0.0
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	-	-	-	-	-	-
METAL REPAIR	-	-	-	-	-	-	-	-
CYLINDER & PISTON	-	-	-	-	14,098	-	14,098	0.3
PROTOTYPE	-	-	-	-	-	-	-	-
FIELD SERVICE	-	-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	-	-	-
TOTAL	383,564	17,590	109,816	726,480	3,206,340	122,070	4,565,860	100.0
%	8.4	0.4	2.4	15.9	70.2	2.7	100.0	

FIGURE A-21

TOTAL
DIRECT MATERIAL (DOLLARS)
1 JUL 77 – 31 DEC 77

MT FUNCTIONAL CATEGORY	PROGRAM	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%	COST DRIVER RANKING
EXAMINATION/EVALUATION		379,105	306,593	727	829,272	39,590	-	1,555,287	1.4	17
DISASSEMBLE/ASSEMBLE		1,425,993	3,809,710	1,513,277	4,308,408	2,002,364	1,336,442	14,396,194	13.3	2
ELECTRICAL/ELECTRONIC		1,867,633	2,111,875	2,996,814	2,406,280	4,929,331	3,151,349	17,458,282	16.2	1
HYDRAULICS/PNEUMATICS		3,940,147	1,452,617	871,028	1,158,630	2,510,058	2,683,029	12,615,509	11.7	3
BONDING		123,012	262,137	-	-	220,638	3,594	609,381	0.6	24
STRIP/FINISH/PAINT		14,068	516,600	18,403	193,158	730	232,084	975,043	0.9	22
WELD		164,017	224,931	69,593	134,768	112,803	66,368	772,480	0.7	23
MACHINE		96,396	1,038,428	130,852	327,902	3,051,112	2,585,312	7,230,002	6.7	4
WIRE CUT/MANUFACTURING		14	71,957	86,393	488,566	2,741,496	-	3,388,426	3.1	12
FORGE/FOUNDRY		3,027	28,078	3,070	-	13,338	31	47,544	0.0	33
LAYOUT/PATTERN		3,028	15,983	-	6,692	6,627	27,830	60,160	0.1	32
SHEET METAL		675,248	1,263,902	513,373	1,145,498	2,111,921	1,007,400	6,717,342	6.2	5
CLEAN, ABRASIVE		666	372,238	5,037	25,490	27,465	-	430,896	0.4	26
CLEAN, CHEMICAL		667	431,112	-	74,824	5,677	-	512,280	0.5	25
HEAT TREAT		29,663	-	25	-	1,438,889	-	1,468,577	1.4	18
PLATING		51	241,780	206	76,102	226	-	318,365	0.3	27
PACKING/PRESERVATION		314,193	509,811	231,935	-	297,887	55,178	1,409,004	1.3	19
CALIBRATION		267,892	74,763	221,189	200,794	1,575,348	162,428	2,502,414	2.3	14
TESTING		389,469	1,042,189	449,702	225,544	1,219,641	328,860	3,655,405	3.4	10
MISCELLANEOUS-										
ARMAMENT		668,167	104,938	563,444	1,610,292	642,198	523,310	4,112,349	3.8	8
BEARINGS		713,165	209,088	305,304	-	-	1,237,979	2,465,536	2.3	15
BLADES - PROP		-	-	52,426	238,694	-	-	291,120	0.3	28
ROTOR		-	677,468	-	-	2,916,688	348,761	3,942,917	3.7	9
CONTROL CABLES		-	-	316	-	-	81,633	81,949	0.1	31
EJECTION SEAT		-	-	18,645	191,112	-	-	209,757	0.2	29
FABRIC/RUBBER/PLASTICS		56,294	138,446	121,893	64,674	722,113	253,814	1,357,234	1.3	20
FLIGHT CONTROLS & SUBASSM.		-	-	148,773	-	-	-	148,773	0.1	30
FUEL CONTROLS & ACCESSORIES		-	-	1,068,321	1,924,958	421,453	-	3,414,732	3.2	11
GROUND SUPPORT EQUIPMENT		514,484	98,703	62,498	242,306	2,373,903	94,063	3,385,957	3.1	13
LANDING GEAR		403,952	134,035	329,946	245,872	-	1,055,638	2,169,443	2.0	16
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	4,178,362	-	-	-	4,178,362	3.9	7
METAL REPAIR		-	-	-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	1,026,732	-	-	-	1,026,732	1.0	21
PROTOTYPE		-	-	-	-	15,160	-	15,160	0.0	34
FIELD SERVICE		-	-	-	-	-	3,610	3,610	0.0	35
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	4,942,432	4,942,432	4.6	6
TOTAL		12,050,351	15,137,382	14,988,284	16,119,836	29,391,656	20,181,145	107,868,654	100.0	
%		11.2	14.0	13.9	14.9	27.2	18.7	100.0		

FIGURE A-22

NAVAIREWORKFAC ALAMEDA
DIRECT MATERIAL (DOLLARS)
1 APR 77 - 30 SEP 77

PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION	(24,305)	0	495	60,802	27,512	314,601	379,105	3.1
DISASSEMBLE/ASSEMBLE	118,084	25,826	1,240,599	38,218	3,242	24	1,425,993	11.8
ELECTRICAL/ELECTRONIC	166,502	-	25,928	1,625,652	42,145	7,406	1,867,633	15.5
HYDRAULICS/PNEUMATICS	141,216	-	805,616	2,975,811	17,223	281	3,940,147	32.7
BONDING	91,786	0	0	27,311	2,697	1,218	123,012	1.0
STRIP/FINISH/PAINT	12,946	0	0	1,086	36	0	14,068	0.1
WELD	147,118	0	0	16,832	47	20	164,017	1.4
MACHINE	2,548	0	61,134	10,899	1,150	20,665	96,396	0.8
WIRE CUT/MANUFACTURING ¹	-	14	-	-	-	-	14	0.0
FORGE/FOUNDRY	1,217	0	0	718	630	3,490	6,055	0.1
LAYOUT/PATTERN								
SHEET METAL	356,746	0	4,978	242,892	42,688	27,944	675,248	5.6
CLEAN, ABRASIVE	263	0	0	1,070	0	0	1,333	0.0
CLEAN, CHEMICAL								
HEAT TREAT	631	0	0	28,990	0	42	29,663	0.2
PLATING	33	0	0	0	18	0	51	0.0
PACKING/PRESERVATION	0	0	0	291,113	22,503	577	314,193	2.6
CALIBRATION	0	0	2,210	75,663	190,019	-	267,892	2.2
TESTING	220,699	48,748	6	93,662	25,748	606	389,469	3.2
MISCELLANEOUS-								
ARMAMENT	36,467	-	-	631,357	343	-	668,167	5.5
BEARINGS	23,271	-	446,605	239,326	634	3,329	713,165	5.9
BLADES - PROP	-	-	-	-	-	-	-	-
ROTOR	-	-	-	-	-	-	-	-
CONTROL CABLES	-	-	-	-	-	-	-	-
EJECTION SEAT	-	-	-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS	43,373	-	-	4,913	4,891	3,117	56,294	0.5
FLIGHT CONTROLS & SUBASSM.	-	-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES	-	-	-	-	-	-	-	-
GROUND SUPPORT EQUIPMENT	17,839	-	70	488,950	7,625	-	514,484	4.3
LANDING GEAR	174,267	-	-	228,789	652	244	403,952	3.4
MECHANICAL MODS. & REPAIR	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE	-	-	-	-	-	-	-	-
METAL REPAIR	-	-	-	-	-	-	-	-
CYLINDER & PISTON	-	-	-	-	-	-	-	-
PROTOTYPE	-	-	-	-	-	-	-	-
FIELD SERVICE	-	-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS	-	-	-	-	-	-	-	-
TOTAL	1,530,701	74,588	2,587,641	7,084,054	389,803	383,564	12,050,351	100.0
	12.7	0.6	21.5	58.8	3.2	3.2	100.0	

NOTES:

¹ INCLUDED IN ELECTRICAL/ELECTRONIC

MT FUNCTIONAL CATEGORY	PROGRAM CATEGORY	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION		12,189	19,905	170,521	103,946	32	306,593	2.0
DISASSEMBLE/ASSEMBLE		144,218	2,535,514	1,096,101	33,797	80	3,809,710	25.2
ELECTRICAL/ELECTRONIC		133,350	74,365	1,880,941	22,800	419	2,111,875	14.0
HYDRAULICS/PNEUMATICS		21,060	485,462	942,196	3,899	-	1,452,617	9.6
BONDING		568	-	261,563	-	6	262,137	1.7
STRIP/FINISH/PAINT		107,571	146,692	261,959	228	150	516,600	3.4
WELD		1,773	126,502	95,054	21	1,581	224,931	1.5
MACHINE		26,257	479,969	524,149	1,193	6,860	1,038,428	6.9
WIRE CUT/MANUFACTURING		10,036	28,217	30,173	3,144	387	71,957	0.5
FORGE/FOUNDRY		1,529	10,734	14,234	-	1,581	28,078	0.2
LAYOUT/PATTERN		3,436	459	11,945	-	143	15,983	0.1
SHEET METAL		136,176	385,010	721,624	16,332	4,760	1,263,902	8.3
CLEAN, ABRASIVE		2,857	134,152	234,666	399	164	372,238	2.5
CLEAN, CHEMICAL		39,879	148,885	241,416	654	278	431,112	2.8
HEAT TREAT ¹		-	-	-	-	-	-	-
PLATING		4,815	80,142	156,481	9	333	241,780	1.6
PACKING/PRESERVATION		1,249	157,261	350,402	899	-	509,811	3.4
CALIBRATION		46	-	52,009	22,708	-	74,763	0.5
TESTING		2,955	654,183	383,717	1,334	-	1,042,189	6.9
MISCELLANEOUS-								
ARMAMENT		14,965	-	83,880	6,093	-	104,938	0.7
BEARINGS		333	85,921	122,714	120	-	209,088	1.4
BLADES - PROP		-	-	-	-	-	-	-
ROTOR		2,911	-	674,557	-	-	677,468	4.5
CONTROL CABLES		-	-	-	-	-	-	-
EJECTION SEAT		-	-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS		57,723	10,611	69,411	-	701	138,446	0.9
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		-	-	-	-	-	-	-
GROUND SUPPORT EQUIPMENT		49	-	98,654	-	-	98,703	0.7
LANDING GEAR		6,024	-	127,896	-	115	138,446	0.9
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-	-
PROTOTYPE		-	-	-	-	-	-	-
FIELD SERVICE		-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-
TOTAL		731,969	5,563,984	8,606,263	217,576	17,590	15,137,382	100.0
%		4.8	36.8	56.9	1.4	0.1	100.0	-

FIGURE A-23
NAVAIREWORKFAC CHERRY POINT
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

NOTES:

¹ INCLUDED IN SHEET METAL/WELD/FORGE/FOUNDRY

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION		468	174	-	(34)	119	727	0.0
DISASSEMBLE/ASSEMBLE		158,347	1,343,384	717	10,806	23	1,513,277	10.1
ELECTRICAL/ELECTRONIC		210,118	17,514	2,743,701	22,900	2,541	2,996,814	20.0
HYDRAULICS/PNEUMATICS ¹		30,970	93,287	669,661	12,845	4,265	871,028	5.8
BONDING ²		-	-	-	-	-	-	-
STRIP/FINISH/PAINT		5,340	5,332	192	6,533	6	18,403	0.1
WELD		25,836	18,580	16,812	8,245	120	69,593	0.5
MACHINE		4,239	92,057	7,484	4,267	22,805	130,852	0.9
WIRE CUT/MANUFACTURING		11,942	20,964	28,753	1,251	23,483	86,393	0.6
FORGE/FOUNDRY		95	-	2,785	190	-	3,070	0.0
LAYOUT/PATTERN ³		-	-	-	-	-	-	-
SHEET METAL		283,111	5,908	184,417	22,642	17,295	513,373	3.4
CLEAN, ABRASIVE		-	5,037	-	-	-	5,037	0.0
CLEAN, CHEMICAL ⁴		-	-	-	-	-	-	-
HEAT TREAT		2	9	-	-	14	25	0.0
PLATING		2	204	-	-	-	206	0.0
PACKING/PRESERVATION		15	51,673	-	151,261	28,986	231,935	1.5
CALIBRATION		-	-	154,643	66,546	-	221,189	1.5
TESTING		66,796	360,863	-	22,043	-	449,702	3.0
MISCELLANEOUS-								
ARMAMENT		9,106	-	302,397	251,941	-	563,444	3.8
BEARINGS		26,220	92,709	181,680	3,992	703	305,304	2.0
BLADES - PROP		-	-	52,426	-	-	52,426	0.3
ROTOR		-	-	-	-	-	-	-
CONTROL CABLES		5	-	197	39	75	316	0.0
EJECTION SEAT		10,101	-	8,063	481	-	18,645	0.1
FABRIC/RUBBER/PLASTICS		36,739	174	73,034	2,565	9,381	121,893	0.8
FLIGHT CONTROLS & SUBASSM.		123,159	-	23,233	2,381	-	148,773	1.0
FUEL CONTROLS & ACCESSORIES		3,184	399,015	664,557	1,265	-	1,068,321	7.1
GROUND SUPPORT EQUIPMENT		172	-	18,545	43,781	-	62,498	0.4
LANDING GEAR		138,766	-	190,954	226	-	329,946	2.2
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		-	3,247,192	891,603	39,567	-	4,178,362	27.9
CYLINDER & PISTON		-	730,047	296,685	-	-	1,026,732	6.9
PROTOTYPE		-	-	-	-	-	-	-
FIELD SERVICE		-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-
TOTAL		1,206,073	6,484,123	6,512,539	675,733	109,816	14,988,284	100.0
		8.0	43.3	43.5	4.5	0.7	100.0	-

FIGURE A-24
NAVAIREWORKFAC JACKSONVILLE
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

NOTES:

¹ NO PNEUMATICS² INCLUDED IN PLASTICS³ INCLUDED IN SHEET METAL⁴ INCLUDED ELSEWHERE

FIGURE A-25

NAVAIREWORKFAC NORFOLK
DIRECT MATERIAL (DOLLARS)
1 APR 78 - 30 SEP 78
(FACTORED FROM 1 JUL 78 - 30 SEP 78 DATA)

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION		25,600	-	766,868	33,870	2,934	-	829,272	5.1
DISASSEMBLE/ASSEMBLE		568,112	-	2,940,172	768,112	32,006	-	4,308,408	26.7
ELECTRICAL/ELECTRONIC		371,466	190,672	76,916	1,541,276	225,850	100	2,406,280	14.9
HYDRAULICS/PNEUMATICS		320,934	-	354,250	434,652	48,784	10	1,158,630	7.2
BONDING		-	-	-	-	-	-	-	-
STRIP/FINISH/PAINT		10,073	-	-	1,410	4,116	177,556	193,158	1.2
WELD		5,272	-	43,698	4,992	7,700	73,106	134,768	0.8
MACHINE		64,220	-	20,456	66,786	21,156	155,284	327,902	2.0
WIRE CUT/MANUFACTURING		62,676	41,802	2,308	28,746	250,388	102,646	488,566	3.0
FORGE/FOUNDRY		-	-	-	-	-	-	-	-
LAYOUT/PATTERN		2,240	-	-	-	-	4,452	6,692	0.0
SHEET METAL		389,806	-	-	203,448	416,844	135,400	1,145,498	7.1
CLEAN, ABRASIVE		1,652	-	-	23,838	-	-	25,490	0.2
CLEAN, CHEMICAL		-	-	-	-	60,808	14,016	74,824	0.5
HEAT TREAT		-	-	-	-	-	-	-	-
PLATING		13,574	968	18,800	31,262	6,738	4,760	76,102	0.5
PACKING/PRESERVATION		-	-	-	-	-	-	-	-
CALIBRATION		1,798	146	-	165,810	32,830	210	200,794	1.2
TESTING		95,968	5,096	21,624	49,446	45,586	3,764	225,544	1.4
MISCELLANEOUS-									
ARMAMENT		24,492	1,342,924	2,012	154,896	71,062	14,906	1,610,292	10.0
BEARINGS		-	-	-	-	-	-	-	-
BLADES - PROP		25,362	-	11,952	201,380	-	-	238,694	1.5
ROTOR		-	-	-	-	-	-	-	-
CONTROL CABLES		-	-	-	-	-	-	-	-
EJECTION SEAT		69,356	-	-	44,076	49,230	28,450	191,112	1.2
FABRIC/RUBBER/PLASTICS		24,448	-	-	25,554	2,854	11,818	64,674	0.4
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		187,878	-	1,143,174	365,402	228,502	2	1,924,958	11.9
GROUND SUPPORT EQUIPMENT		654	-	-	237,964	3,688	-	242,306	1.5
LANDING GEAR		164,983	-	-	74,092	6,792	-	245,872	1.5
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-	-	-
PROTOTYPE		-	-	-	-	-	-	-	-
FIELD SERVICE		-	-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-	-
TOTAL		2,434,572	1,581,608	5,402,290	4,457,018	1,517,868	726,480	16,119,836	100.0
		15.1	9.8	33.5	27.6	9.4	4.5	100.0	-

FIGURE A-26

NAVAIREWORKFAC NORTH ISLAND
 DIRECT MATERIAL (DOLLARS)
 1 JUL 77 – 31 DEC 77
 (FACTORED FROM 1 JUL 77 – 1 JUL 78 DATA)

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION		-	-	-	39,590	-	39,590	0.1
DISASSEMBLE/ASSEMBLE		840,008	466,427	438,590	199,222	58,117	2,002,364	6.8
ELECTRICAL/ELECTRONIC		1,563,176	111,163	2,847,542	313,472	88,978	4,924,331	16.8
HYDRAULICS/PNEUMATICS		555,015	-	1,909,851	44,633	559	2,510,058	8.5
BONDING		32	-	219,942	63	601	220,638	0.8
STRIP/FINISH/PAINT		717	-	7	-	6	730	0.0
WELD		4,250	29,297	48,160	27,183	3,913	112,803	0.4
MACHINE		393,196	650,186	1,703,553	117,121	187,056	3,051,112	10.4
WIRE CUT/MANUFACTURING		45,035	408	45,419	54,703	2,595,931	2,741,496	9.3
FORGE/FOUNDRY		-	-	32	12	13,294	13,338	0.1
LAYOUT/PATTERN		23	-	-	3	6,601	6,627	0.0
SHEET METAL		1,195,396	101,696	484,710	121,350	208,769	2,111,921	7.2
CLEAN, ABRASIVE		5,242	5,244	14,600	2,375	4	27,465	0.1
CLEAN, CHEMICAL		-	2,372	3,305	-	-	5,677	0.0
HEAT TREAT		16,870	1,190,758	224,641	6,596	24	1,438,889	4.9
PLATING		-	-	216	10	-	226	0.0
PACKING/PRESERVATION		2,786	44	-	294,908	149	297,887	1.0
CALIBRATION		158,463	-	950,316	464,781	1,788	1,575,348	5.4
TESTING		383,002	249,713	236,335	324,409	26,182	1,219,641	4.2
MISCELLANEOUS-								
ARMAMENT		289,794	46,236	299,320	6,848	-	642,198	2.2
BEARINGS		-	-	-	-	-	-	-
BLADES - PROP		-	-	-	-	-	-	-
ROTOR		173,118	30,545	2,704,724	8,190	111	2,916,688	9.9
CONTROL CABLES		-	-	-	-	-	-	-
EJECTION SEAT		-	-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS		606,970	115,143	-	-	-	722,113	2.5
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		21,554	192,866	188,727	18,147	159	421,453	1.4
GROUND SUPPORT EQUIPMENT		865,578	259,333	782,389	466,503	-	2,373,903	8.1
LANDING GEAR		-	-	-	-	-	-	-
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-	-
PROTOTYPE		347	-	132	583	14,098	15,160	0.1
FIELD SERVICE		-	-	-	-	-	-	-
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	-	-
TOTAL		7,120,572	3,451,431	13,102,511	2,510,802	3,206,340	29,391,656	100.0
		24.2	11.7	44.6	8.5	10.9	100.0	

MT FUNCTIONAL CATEGORY	PROGRAM	AIRCRAFT REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION		-	-	-	-	-	-
DISASSEMBLE/ASSEMBLE		1,144,152	183,263	7,424	1,603	1,336,442	6.6
ELECTRICAL/ELECTRONIC		165,258	2,600,072	356,076	29,943	3,151,349	15.6
HYDRAULICS/PNEUMATICS		283,410	2,381,568	15,713	2,338	2,683,029	13.3
BONDING		3,081	513	-	-	3,594	0.0
STRIP/FINISH/PAINT		226,119	1,108	4,756	101	232,084	1.2
WELD		52,462	12,944	962	-	66,368	0.3
MACHINE		15,993	2,497,154	33,693	38,472	2,585,312	12.8
WIRE CUT/MANUFACTURING ¹		-	-	-	-	-	-
FORGE/FOUNDRY		-	-	-	31	31	0.0
LAYOUT/PATTERN		2,376	61	24,078	1,315	27,830	0.1
SHEET METAL		607,738	175,478	191,649	32,535	1,007,400	5.0
CLEAN, ABRASIVE		-	-	-	-	-	-
CLEAN, CHEMICAL		-	-	-	-	-	-
HEAT TREAT		-	-	-	-	-	-
PLATING		-	-	-	-	-	-
PACKING/PRESERVATION		361	54,646	171	-	55,178	0.3
CALIBRATION		273	135,302	26,853	-	162,428	0.8
TESTING		314,728	1,699	12,433	-	328,860	1.6
MISCELLANEOUS-							
ARMAMENT		392,124	125,703	5,483	-	523,310	2.6
BEARINGS		104,890	1,130,201	2,215	673	1,237,979	6.1
BLADES - PROP		-	-	-	-	-	-
ROTOR		298,395	48,707	393	1,266	348,761	1.7
CONTROL CABLES		43,214	22,476	4,454	11,489	81,633	0.4
EJECTION SEAT		-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS		221,991	12,661	16,916	2,246	253,814	1.3
FLIGHT CONTROLS & SUBASSM.		-	-	-	-	-	-
FUEL CONTROLS & ACCESSORIES		-	-	-	-	-	-
GROUND SUPPORT EQUIPMENT		2,340	81,894	9,817	12	94,063	0.5
LANDING GEAR		564,387	480,221	10,984	46	1,055,638	5.2
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	-	-	-	-
METAL REPAIR		-	-	-	-	-	-
CYLINDER & PISTON		-	-	-	-	-	-
PROTOTYPE		-	-	-	-	-	-
FIELD SERVICE		70	-	3,540	-	3,610	0.0
HELO. DYNAMIC COMPONENTS		369,644	4,568,805	3,983	-	4,942,432	24.5
TOTAL		4,813,006	14,514,476	731,593	122,070	20,181,145	100.0
%		23.8	71.9	3.6	0.6	100.0	

FIGURE A-27
NAVAIREWORKFAC PENSACOLA
DIRECT MATERIAL (DOLLARS)
1 JAN 78 - 30 JUN 78

NOTES: ¹INCLUDED IN ELECTRICAL/ELECTRONIC

FIGURE A-28
TOTAL
DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	PROGRAM CATEGORY	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%	COST DRIVER RANKING
EXAMINATION/EVALUATION		13,952	-	787,442	265,193	173,948	314,752	1,555,287	1.4	17
DISASSEMBLE/ASSEMBLE		2,972,921	25,826	8,526,096	2,525,007	286,497	59,847	14,396,194	13.3	2
ELECTRICAL/ELECTRONIC		2,609,910	190,672	305,886	13,239,184	983,243	129,387	17,458,282	16.1	1
HYDRAULICS/PNEUMATICS		1,412,605	-	1,738,615	9,313,739	143,097	7,453	12,615,509	11.7	3
BONDING		95,467	-	-	509,329	2,760	1,825	609,381	0.6	24
STRIP/FINISH/PAINT		363,769	-	152,024	265,762	15,669	177,819	975,043	0.9	22
WELD		236,711	-	218,077	194,794	44,158	78,740	772,480	0.7	23
MACHINE		506,453	-	1,303,802	4,810,025	178,580	431,142	7,230,002	6.7	4
WIRE CUT/MANUFACTURING		129,689	41,816	51,897	133,091	309,486	2,722,447	3,388,426	3.1	12
FORGE/FOUNDRY		2,232	-	10,734	17,410	517	16,651	47,544	0.0	33
LAYOUT/PATTERN		8,684	-	459	12,365	24,396	14,256	60,160	0.1	32
SHEET METAL		2,968,973	-	497,592	2,012,569	811,505	426,703	6,717,342	6.2	5
CLEAN, ABRASIVE		9,882	-	144,433	273,639	2,774	168	430,896	0.4	26
CLEAN, CHEMICAL		40,011	-	151,257	245,256	61,462	14,294	512,280	0.5	25
HEAT TREAT		17,503	-	1,190,767	253,631	6,596	80	1,468,577	1.4	18
PLATING		18,424	968	99,146	187,959	6,775	5,093	318,365	0.3	27
PACKING/PRESERVATION		4,411	-	208,978	696,161	469,742	29,712	1,409,004	1.3	19
CALIBRATION		160,580	146	2,210	1,533,743	803,737	1,998	2,502,414	2.3	14
TESTING		1,088,148	53,844	1,286,449	764,859	431,553	30,552	3,655,405	3.4	10
MISCELLANEOUS-										
ARMAMENT		766,948	1,342,924	48,248	1,597,553	341,770	14,906	4,112,349	3.8	8
BEARINGS		154,714	-	625,235	1,673,921	6,961	4,705	2,465,536	2.3	15
BLADES - PROP		25,362	-	11,952	253,806	-	-	291,120	0.3	28
ROTOR		474,424	-	30,545	3,427,988	8,583	1,377	3,942,917	3.7	9
CONTROL CABLES		43,219	-	-	22,673	4,493	11,564	81,949	0.1	31
EJECTION SEAT		79,457	-	-	52,139	49,711	28,450	209,757	0.2	29
FABRIC/RUBBER/PLASTICS		991,244	-	125,928	185,573	27,226	27,263	1,357,234	1.3	20
FLIGHT CONTROLS & SUBASSM.		123,159	-	-	23,233	2,381	-	148,773	0.1	30
FUEL CONTROLS & ACCESSORIES		212,916	-	1,735,055	1,218,686	247,914	161	3,414,732	3.2	11
GROUND SUPPORT EQUIPMENT		886,632	-	259,403	1,708,396	531,514	12	3,385,957	3.1	13
LANDING GEAR		1,048,432	-	-	1,101,952	18,654	405	2,169,443	2.0	16
MECHANICAL MODS. & REPAIR		-	-	-	-	-	-	-	-	-
COMPRESSOR/TURBINE/ENGINE		-	-	3,247,192	891,603	39,567	-	4,178,362	3.9	7
METAL REPAIR		-	-	730,047	296,685	-	-	1,026,732	1.0	21
CYLINDER & PISTON		-	-	-	132	583	14,098	15,160	0.0	34
PROTOTYPE		347	-	-	-	3,540	-	3,610	0.0	35
FIELD SERVICE		70	-	-	-	3,983	-	4,942,432	4.6	6
HELO. DYNAMIC COMPONENTS		369,644	-	-	4,568,805	6,043,375	4,565,860	107,868,654	100.0	-
TOTAL		17,836,893	1,656,196	23,489,469	54,276,861	6,043,375	4.2	100.0	-	-
%		16.5	1.5	21.8	50.3	5.6	4.2	100.0	-	-

FIGURE A-29

GRAND TOTAL
DIRECT LABOR AND DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	PROGRAM	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL		COST DRIVER RANKING
EXAMINATION/EVALUATION		1,709,886	867,528	118,914	1,575,297	822,254	452,925	5,546,804	2.5	11
DISASSEMBLE/ASSEMBLE		3,739,894	6,787,384	2,488,017	8,868,349	7,440,693	3,571,538	32,895,875	15.0	2
ELECTRICAL/ELECTRONIC		5,498,191	4,047,686	5,380,945	6,900,989	9,800,506	7,968,395	39,596,712	18.1	1
HYDRAULICS/PNEUMATICS		6,221,117	2,178,360	1,221,403	1,761,999	2,972,355	3,491,566	17,846,800	8.2	4
BONDING		487,328	422,185	-	-	394,874	197,752	1,502,139	0.7	26
STRIP/FINISH/PAINT		794,445	1,004,885	756,822	766,684	1,066,977	1,038,440	5,428,261	2.5	17
WELD		378,073	332,356	243,516	440,826	284,272	150,577	1,779,622	0.8	23
MACHINE		1,251,147	1,649,367	785,242	1,725,003	4,755,795	3,762,331	13,928,885	6.4	5
WIRE CUT/MANUFACTURING		251	152,256	134,810	896,405	3,592,154	-	4,775,876	2.2	15
FORGE/FOUNDRY		80,761	68,852	16,411	-	52,384	62,017	281,425	0.1	33
LAYOUT/PATTERN		80,762	35,490	-	185,326	78,797	187,490	567,874	0.3	30
SHEET METAL		2,945,536	2,702,843	1,782,096	4,850,964	5,740,954	4,017,469	22,039,862	10.1	3
CLEAN, ABRASIVE		187,063	534,957	237,529	393,031	134,841	165,820	1,653,241	0.8	24
CLEAN, CHEMICAL		188,089	717,137	-	408,483	108,557	501,327	1,923,595	0.9	22
HEAT TREAT		76,369	-	20,888	-	1,745,293	84,209	1,926,759	0.9	21
PLATING		116,367	382,007	255,393	405,975	175,494	243,972	1,579,213	0.7	25
PACKING/PRESERVATION		839,979	705,631	535,656	330,299	595,507	490,497	3,497,564	1.6	17
CALIBRATION		1,125,423	242,102	642,776	649,197	2,763,799	494,029	5,917,326	2.7	9
TESTING		2,219,674	1,424,672	865,587	1,653,334	3,909,482	1,252,726	11,325,475	5.2	6
MISCELLANEOUS										
ARMAMENT		1,194,757	224,699	847,795	2,593,864	803,525	811,674	6,476,314	3.0	7
BEARINGS		965,601	283,347	358,860	-	226,670	1,452,113	3,286,586	1.5	18
BLADES - PROP		-	-	97,817	711,102	-	-	808,919	0.4	28
ROTOR		-	1,097,746	-	-	3,351,656	459,673	4,909,075	2.2	13
CONTROL CABLES		-	-	5,112	-	-	138,408	143,520	0.1	34
EJECTION SEAT		-	-	38,109	397,474	-	-	435,583	0.2	32
FABRIC/RUBBER/PLASTICS		275,452	375,903	233,766	184,688	916,577	452,075	2,438,461	1.1	20
FLIGHT CONTROLS & SUBASM.		-	-	541,921	-	-	-	541,921	0.2	31
FUEL CONTROLS & ACCESSORIES		-	-	1,428,675	2,874,981	518,035	-	4,821,691	2.2	14
GROUND SUPPORT EQUIPMENT		1,147,723	162,376	349,624	521,437	3,580,813	159,041	5,921,014	2.7	8
LANDING GEAR		558,486	234,482	379,584	345,495	-	1,274,018	2,792,065	1.3	19
MECHANICAL MODS. & REPAIR		-	-	76,480	-	-	-	76,480	0.0	36
COMPRESSOR/TURBINE/ENGINE		-	-	4,390,047	-	-	-	4,390,047	2.0	16
METAL REPAIR		-	-	-	-	-	-	-	-	-
CYLINDER & PISTON		-	-	1,111,132	-	-	-	1,111,132	0.5	27
PROTOTYPE		-	-	-	-	79,740	-	79,740	0.0	35
FIELD SERVICE		-	-	-	375,656	-	261,754	637,410	0.3	29
HELO. DYNAMIC COMPONENTS		-	-	-	-	-	5,719,835	5,719,835	2.6	10
TOTAL		32,032,374	26,634,246	25,344,927	39,816,860	55,912,004	38,862,690	218,603,101	100.0	-
		14.7	12.2	11.6	18.2	25.6	17.8	100.0		

FIGURE A-30

GRAND TOTAL
DIRECT LABOR AND DIRECT MATERIAL (DOLLARS)
1 JUL 77 - 31 DEC 77

MT FUNCTIONAL CATEGORY	PROGRAM AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%	COST DRIVER RANKING
EXAMINATION/EVALUATION	2,133,985	39,022	1,452,942	1,027,626	553,460	339,769	5,546,804	2.5	11
DISASSEMBLE/ASSEMBLE	15,926,354	233,199	12,082,900	3,438,809	1,127,877	86,736	32,895,875	15.0	2
ELECTRICAL/ELECTRONIC	10,348,709	313,526	814,849	25,172,702	2,656,192	290,734	39,596,712	18.1	1
HYDRAULICS/PNEUMATICS	2,185,185		2,472,180	12,856,732	317,581	15,122	17,846,800	8.2	4
BONDING	489,568	194	1,565	972,206	23,621	14,985	1,502,139	0.7	26
STRIP/FINISH/PAINT	3,473,190	28,631	315,617	959,578	314,183	337,062	5,478,261	2.5	12
WELD	406,124	184	554,816	473,921	144,169	200,408	1,779,622	0.8	23
MACHINE	1,707,209	2,322	2,847,507	6,792,035	764,395	1,815,417	13,928,885	6.4	5
WIRE CUT/MANUFACTURING	330,593	53,200	66,198	377,461	396,050	3,552,374	4,775,876	2.2	15
FORGE/FOUNDRY	22,785	75	17,690	37,058	46,679	157,138	281,425	0.1	33
LAYOUT/PATTERN	52,947	76	681	24,859	172,153	317,158	567,874	0.3	30
SHEET METAL	14,157,239	393	737,254	3,445,152	2,666,487	1,033,337	22,039,862	10.1	3
CLEAN, ABRASIVE	325,314	6,918	424,329	819,726	59,826	17,128	1,653,241	0.8	24
CLEAN, CHEMICAL	958,433	12,156	309,878	500,888	121,281	20,959	1,923,595	0.9	22
HEAT TREAT	52,707	-	1,274,597	493,755	26,023	79,677	1,926,759	0.9	21
PLATING	223,045	10,309	350,080	851,422	70,058	74,299	1,579,213	0.7	25
PACKING/PRESERVATION	220,639	19	323,959	1,448,581	1,445,029	59,337	3,497,564	1.6	17
CALIBRATION	258,493	257	2,338	2,916,721	2,737,076	2,441	5,917,326	2.7	9
TESTING	5,871,668	769,956	1,997,177	1,525,349	1,102,037	59,288	11,325,475	5.2	6
MISCELLANEOUS--									
ARMAMENT	1,524,411	1,813,123	86,492	2,488,909	538,781	24,598	6,476,314	3.0	7
BEARINGS	198,771	-	707,632	2,094,937	53,459	231,787	3,286,586	1.5	18
BLADES - PROP	39,843	1	231,816	487,994	49,265	-	808,919	0.4	28
ROTOR	601,683	-	31,353	4,248,925	21,238	5,876	4,909,075	2.2	13
CONTROL CABLES	69,921	-	-	39,207	10,641	23,751	143,520	0.1	34
EJECTION SEAT	159,776	-	9,029	155,859	80,394	30,525	435,583	0.2	32
FABRIC/RUBBER/PLASTICS	1,710,644	-	136,586	372,154	100,624	118,453	2,438,461	1.1	20
FLIGHT CONTROLS & SUBASSM.	500,803	-	28	28,618	12,472	-	541,921	0.2	31
FUEL CONTROLS & ACCESSORIES	630,513	-	2,160,102	1,676,882	350,588	3,606	4,821,691	2.2	14
GROUND SUPPORT EQUIPMENT	1,210,832	-	259,625	3,178,971	1,070,817	200,769	5,921,014	2.7	8
LANDING GEAR	1,323,082	-	4,359	1,410,893	47,686	6,045	2,792,065	1.3	19
MECHANICAL MODS. & REPAIR	416	-	-	-	76,064	-	76,480	0.0	36
COMPRESSOR/TURBINE/ENGINE	152	-	3,413,584	933,490	42,821	-	4,390,047	2.0	16
METAL REPAIR	-	-	783,596	326,014	1,522	-	1,111,132	0.5	27
CYLINDER & PISTON	-	-	24	1,557	15,529	58,409	79,740	0.0	35
PROTOTYPE	4,221	-	306	158,650	440,354	33,056	637,410	0.3	29
FIELD SERVICE	5,044	-	-	5,298,494	33,174	-	5,719,835	2.6	10
HELO. DYNAMIC COMPONENTS	388,167	-	-	-	-	-	-	-	-
TOTAL	67,512,466	3,283,561	33,871,089	87,036,135	17,689,606	9,210,244	218,603,101	100.0	-
	30.9	1.5	15.5	39.8	8.1	4.2	100.0	-	-

FIGURE A-31

N/C MACHINE UTILIZATION
NAVAIREWORKFAC ALAMEDA
1 JUL 77 – 31 DEC 77

MACHINE/ PROCESS	N/C MACHINE	PRODUCTION TIME (HOURS)								CUTTING TIME (HOURS)							
		JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%
LATHES	CINCINNATI LATHE I	57.2	38.0	55.3	0.0	0.0	86.8	237.3	2.6	47.0	30.5	49.3	0.0	0.0	67.3	194.1	3.0
	BULLARD VTL						45.5	45.5	0.5						42.5	42.5	0.7
	WADELL TURRET LATHE I	35.9	103.0	113.0	95.0	36.8	7.6	391.3	4.2	20.9	93.5	75.1	46.5	23.9	6.9	266.8	4.1
	WADELL TURRET LATHE II	18.0	95.7	124.0	96.5	246.0	137.1	717.3	7.8	7.0	76.0	110.2	83.5	235.0	119.6	631.3	9.7
	CINCINNATI LATHE II	55.7	138.8	76.9	117.6	162.3	100.7	652.0	7.1	48.1	114.7	67.3	104.2	127.4	23.7	485.4	7.5
	JONES & LAMSON PRODUCTION CENTER	27.8	37.1	62.1	68.0	71.0	107.4	373.4	4.0	13.3	36.0	14.5	63.7	52.5	103.1	283.1	4.4
	WARNER & SWASEY TURRET	273.4	301.6	21.5	173.0	267.4	100.0	1,136.9	12.3	217.3	289.1	19.5	125.6	217.1	63.8	932.4	14.4
DRILLS	TAPE-O-MATIC DRILL	46.2	84.0	32.0	3.5	128.0	19.0	312.7	3.4	37.5	74.0	31.5	3.5	50.6	17.2	214.3	3.3
	BURGMASER DRILL 3000	94.6	108.6	122.6	48.7	118.1	98.9	591.5	6.4	68.8	42.3	43.2	36.5	82.3	43.9	317.0	4.9
	BURGMASER DRILL 6000				0.0		45.5	45.5	0.5				0.0		38.5	38.5	0.6
PUNCH	STRIP PIT FABRAMATIC PUNCH		56.0	96.0	0.0		34.3	186.3	2.0		56.0	96.0	0.0		16.0	168.0	2.6
MILLS/BORING MILL	MONARCH EDLUND MILL	0.0	36.3	0.0	24.0	37.4	33.0	130.7	1.4	0.0	26.2	0.0	19.2	28.0	1.0	74.4	1.1
	BRIDGEPORT MILL I	180.5	237.0	141.0	150.0	234.5	129.1	1,072.1	11.6	105.5	134.5	77.5	91.0	118.5	59.0	586.0	9.0
	BRIDGEPORT MILL II	203.7	174.9	109.5	62.0	88.0	13.0	651.1	7.1	148.3	86.3	58.5	58.5	69.5	0.0	421.1	6.5
	SUNDSTRAND MILL 4-AXIS I	129.8	284.7	79.1	38.6	59.7	19.2	611.1	6.6	55.3	248.7	62.1	11.5	14.0	0.0	391.6	6.0
	SUNDSTRAND MILL 4-AXIS II	68.4	0.0	31.4	22.7	113.5	22.0	258.0	2.8	40.8	0.0	22.1	16.6	109.5	21.0	210.0	3.2
	SUNDSTRAND MILL 4-AXIS III	0.0	75.7	192.2	158.8	186.1	8.0	620.8	6.7	0.0	7.5	117.1	152.7	180.2	0.0	457.5	7.0
MACHINING CENTERS	KEARNEY-TRECKER MODEL II 4-AXIS	263.2	129.2	3.5	76.6	124.5	100.1	697.1	7.6	190.8	99.7	3.5	23.8	53.1	48.6	419.5	6.5
	KEARNEY-TRECKER MODEL II 4-AXIS				39.0	16.0	0.0	55.0	0.6				26.3	13.8	0.0	40.1	0.6
	KEARNEY-TRECKER MODULINE (5-AXIS)	0.0	53.5	28.4	20.9	51.7	67.6	222.1	2.4	0.0	49.1	23.7	2.0	36.2	34.4	145.4	2.2
GRINDER	ELECTRODYNE GRINDER				0.0			0.0	0.0				0.0			0.0	0.0
ROUTER	N/C ROUTER		107.5	73.0	0.0		42.5	223.0	2.4		84.0	63.0	0.0		23.5	170.5	2.6
	TOTAL	1,454.4	2,061.6	1,361.5	1,194.9	1,941.0	1,217.3	9,230.7	100.0	1,000.6	1,548.1	934.1	865.1	1,411.6	730.0	6,489.5	100.0

FIGURE A-32
N/C MACHINE UTILIZATION
NAVAIREWORKFAC CHERRY POINT
1 JUL 77 – 31 DEC 77

MACHINE/ PROCESS	N/C MACHINE	PRODUCTION TIME (HOURS)								CUTTING TIME (HOURS)							
		JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%
LATHES	CINCINNATI TURNING CENTER	116.0	106.0	38.0	142.0	128.0	67.0	597.0	8.9	112.5	99.5	38.0	139.0	123.0	45.5	557.5	9.7
	WADELL TURRET LATHE	20.5	192.0	47.0	48.0	106.0	48.0	461.5	6.8	6.5	160.5	47.0	45.0	72.5	43.5	375.0	6.5
PUNCH	STRIPPIT PUNCH	39.0	66.0	79.0	23.0	47.0	12.0	266.0	3.9	31.0	43.0	51.0	14.0	29.0	8.0	176.0	3.1
MILLS/BORING MILL	GORTON MILL	0.0	123.5	130.5	76.0	112.0	133.0	575.0	8.5	0.0	83.5	97.0	52.0	80.0	91.5	404.0	7.0
	PRATT WHITNEY JIG BORE II	88.0	40.0	120.0	40.0	64.0	80.0	432.0	6.4	88.0	40.0	120.0	40.0	64.0	72.0	424.0	7.4
	BRIDGEPORT MILL	114.0	202.5	147.5	138.0	139.0	32.0	773.0	11.5	102.5	180.5	145.5	138.0	117.5	32.0	716.0	12.4
MACHINING CENTERS	K T MOD II MACHINING CENTER II	78.5	80.0	112.0	119.0	217.5	193.5	800.5	11.9	78.5	80.0	112.0	119.0	190.5	188.0	768.0	13.3
	OMI OMNIMILL 258	63.0	225.0	59.0	137.5	90.0	96.0	670.5	9.9	57.0	217.5	59.0	137.5	45.0	74.0	590.0	10.3
	OMI OMNIMILL 268	110.0	4.0	20.0	0.0	16.0	0.0	150.0	2.2	110.0	4.0	16.0	0.0	16.0	0.0	146.0	2.5
	2010 AMERICAN HUSTLER	117.5	163.7	191.5	172.0	296.5	231.0	1,172.2	17.4	99.0	147.6	162.5	135.1	295.0	221.4	1,060.6	18.4
	MONARCH VMC 200	154.0	79.0	116.0	109.5	164.0	56.0	678.5	10.1	94.5	52.0	64.5	70.0	101.0	24.0	406.0	7.1
	MONARCH TC1	-	-	-	-	-	168.0	168.0	2.5	-	-	-	-	-	130.5	130.5	2.3
	TOTAL	900.5	1,281.7	1,060.5	1,005.0	1,380.0	1,116.5	6,744.2	100.0	779.5	1,108.1	912.5	889.6	1,133.5	930.4	5,753.6	100.0

FIGURE A-33

N/C MACHINE UTILIZATION
NAVAIREWORKFAC JACKSONVILLE
1 JUL 77 – 31 DEC 77

MACHINE/ PROCESS	N/C MACHINE	CODE	PRODUCTION TIME (HOURS)								CUTTING TIME (HOURS)							
			JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%
LATHES	BULLARD VTL DYN-AU-TROL	09	0.0	—	—	—	—	—	—	—	0.0	—	—	—	—	—	—	—
	CINCINNATI TURNING CENTER	17	63.5	65.0	0.0	0.0	66.0	4.0	198.5	3.2	57.5	33.0	0.0	0.0	64.0	0.0	154.5	3.5
	WADELL LATHE	18	76.0	130.5	231.5	153.0	144.0	140.0	875.0	13.9	40.0	111.5	164.0	91.0	47.3	102.0	555.8	12.8
DRILLS	PRATT-WHITNEY 2 AX DRILL MOD C	34	30.0	24.0	32.0	56.0	64.0	96.0	302.0	4.8	9.0	0.0	8.0	12.0	0.0	0.0	29.0	0.7
	BURGMASER DRILL 8 SPINDLE	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MILLS/BORING MILL	BRIDGEPORT PROFILER	51	142.0	212.0	188.0	107.5	195.0	145.5	990.0	15.7	108.5	171.5	132.5	63.0	113.0	54.0	642.5	14.8
	LUCAS HORZ BORE-DRILL MILL	57	35.5	37.4	98.0	25.0	64.0	16.0	275.9	4.4	8.0	0.0	9.0	0.0	8.0	0.0	25.0	0.6
MACHINING CENTERS	K-T MOD II MACHINING CENTER 1	52	16.0	168.0	24.5	47.0	58.0	0.0	313.5	5.0	14.0	152.5	18.0	43.0	48.5	0.0	276.0	6.3
	K-T MOD II MACHINING CENTER 2	53	0.0	164.0	69.0	124.5	67.5	44.0	469.0	7.4	0.0	149.0	53.5	107.5	57.0	34.5	401.5	9.2
	GIDDINGS-LEWIS 2 AXIS MILL	54	333.5	158.0	71.6	66.5	8.0	61.0	698.6	11.1	284.5	156.0	38.1	39.5	8.0	29.5	555.6	12.8
	SUNDSTRAND 4-AX OMI-1	55	0.0	0.0	24.0	192.0	109.5	104.0	429.5	6.8	0.0	0.0	24.0	176.5	103.0	91.5	395.0	9.1
	SUNDSTRAND 4-AXIS OMI-2	55	235.0	245.0	166.0	4.0	13.5	147.0	810.5	12.9	225.5	239.5	139.0	4.0	7.5	113.0	728.5	16.7
	KEARNEY-TRECKER 5 AXIS MILL	56	200.5	199.5	101.0	179.7	149.5	104.0	934.2	14.8	142.5	107.5	61.5	154.0	85.0	41.0	591.5	13.6
	TOTAL		1,132.0	1,403.4	1,005.6	955.2	939.0	861.5	6,296.7	100.0	889.5	1,120.5	647.6	690.5	541.3	465.5	4,354.9	100.1

DATA SOURCE: N/C MACHINE UTILIZATION REPORT

FIGURE A-34

N/C MACHINE UTILIZATION
NAVAIREWORKFAC NORFOLK
1 JUL 77 – 31 DEC 77

MACHINE/ PROCESS	N/C MACHINE	PRODUCTION TIME (HOURS)								CUTTING TIME (HOURS)							
		JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%
LATHES	CINCINNATI TURNING CENTER	104.0	142.4	98.0	80.0	66.5	167.0	657.9	4.9	67.0	126.8	85.5	66.6	65.0	153.0	563.9	5.3
	WADELL TURRET LATHE	211.8	243.4	209.0	231.9	152.9	218.1	1,267.1	9.4	138.1	181.0	140.3	183.4	115.5	186.0	944.3	8.9
	AMERICAN 4 AXIS TURNING CENTER	93.9	24.0	36.8	13.0	52.5	79.6	299.8	2.2	76.1	18.6	25.6	11.3	33.1	69.2	233.9	2.2
	WARNER SWASEY 1-SC LATHE	55.5	152.5	154.0	139.6	151.8	159.0	812.4	6.0	29.6	104.8	111.0	109.9	108.4	100.6	564.3	5.3
DRILLS	BURGMASER DRILL 6 SPINDLE	128.7	51.9	147.0	138.7	118.3	151.1	735.7	5.5	115.8	37.7	109.4	95.0	93.2	117.4	568.5	5.4
	BURGMASER DRILL 8 SPINDLE	126.0	171.2	167.5	149.2	147.6	136.3	897.8	6.7	108.6	149.9	127.3	120.6	118.1	113.1	737.6	7.0
MILLS/BORING MILL	BRIDGEPORT MILL	53.5	116.2	110.5	102.8	120.0	123.5	626.5	4.7	45.6	99.6	86.1	78.2	107.3	102.6	519.4	4.9
	LEBLOND FORMATIC JIG BORER	18.0	69.5	0.0	-	-	-	87.5	0.5	13.5	62.0	0.0	-	-	-	75.5	0.7
MACHINING CENTERS	K-T MODEL II MACHINING CENTER II	40.5	92.0	33.0	45.5	NA	NA	211.0	1.6	37.0	85.5	27.5	25.4	NA	NA	175.4	1.7
	SUNDSTRAND OM3 MACHINING CENTER	77.2	293.0	150.5	315.5	384.5	459.5	1,680.2	12.5	31.4	191.5	128.0	277.1	284.3	411.1	1,323.4	12.5
	DEVLEIGH MACHINING CENTER I	10.0	0.0	120.5	148.5	229.5	147.3	655.8	4.9	6.2	0.0	70.2	131.3	204.7	123.9	536.3	5.1
	DEVLEIGH MACHINING CENTER II	161.0	246.5	277.4	172.5	259.6	210.5	1,327.5	9.9	81.2	165.4	246.7	163.0	250.1	172.7	1,079.1	10.2
	GIDDINGS/LEWIS 5V MACHINING CENTER	119.5	104.0	101.5	188.9	132.7	92.8	739.4	5.5	75.1	66.7	74.3	165.0	109.1	64.6	554.8	5.3
	SUNDSTRAND OMI MACHINING CENTER I	52.8	180.7	150.7	26.2	12.0	168.0	590.4	4.4	25.6	163.8	117.6	8.5	11.5	139.0	466.0	4.4
	SUNDSTRAND OMI MACHINING CENTER II	160.3	37.5	93.4	149.5	208.1	188.4	837.2	6.2	130.7	34.5	76.8	125.7	167.8	123.6	659.1	6.2
	SUNDSTRAND OMI MACHINING CENTER III	134.5	175.1	126.1	193.0	186.3	192.2	1,007.2	7.5	88.4	155.5	91.4	164.5	160.6	161.1	821.5	7.8
	SUNDSTRAND OMI MACHINING CENTER IV	98.7	123.8	149.1	181.3	214.2	183.9	951.0	7.1	78.2	96.4	122.5	150.1	146.6	125.7	719.5	6.8
TUBE BENDER	VECTORBEND	-	-	-	11.9	65.6	-	77.5	0.6	-	-	-	0.0	16.8	-	16.8	0.2
	TOTAL	1,645.9	2,223.7	2,125.0	2,288.0	2,502.1	2,677.2	13,461.9	100.0	1,148.1	1,739.7	1,640.2	1,875.6	1,992.1	2,163.6	10,559.3	100.0

FIGURE A-35
N/C MACHINE UTILIZATION
NAVAIREWORKFAC NORTH ISLAND
1 JUL 77 - 31 DEC 77

MACHINE/ PROCESS	N/C MACHINE	PRODUCTION TIME (HOURS)								CUTTING TIME (HOURS)							
		JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%
LATHES	CINCINNATI TURNING CENTER	44.2	16.7	0.0	0.0	0.0	0.0	60.9	0.4	39.7	14.2	0.0	0.0	0.0	0.0	53.9	0.4
	WADDELL TURRET LATHE DNC	209.0	112.0	104.0	171.0	69.0	138.0	803.0	4.7	123.0	87.0	84.0	136.0	60.0	118.0	608.0	4.2
	JONES & LAMSON PRODUCTION CENTER	182.5	319.8	280.7	128.5	153.1	202.0	1,266.6	7.4	118.6	208.7	155.7	76.0	86.1	102.0	747.1	5.2
	JONES & LAMSON 1508-A CHUCKER 1	0.0	0.0	0.0	0.0	121.0	44.0	165.0	1.0	0.0	0.0	0.0	0.0	88.5	31.5	120.0	0.8
	JONES & LAMSON 1508-A CHUCKER 2	0.0	0.0	0.0	0.0	321.5	173.7	495.2	2.9	0.0	0.0	0.0	0.0	175.5	83.7	259.2	1.8
DRILL	PRATT & WHITNEY DRILL MODEL C	184.0	184.0	168.0	159.0	168.0	192.0	1,055.0	6.2	184.0	184.0	168.0	159.0	168.0	192.0	1,055.0	7.4
PUNCHES	WHITNEY PUNCH PRESS	21.0	44.0	89.0	28.0	52.0	53.0	287.0	1.7	21.0	39.5	87.0	26.5	52.0	53.0	279.0	1.9
	STRIPPIT PUNCH PRESS	36.0	87.0	32.5	45.0	41.5	118.0	360.0	2.1	36.0	79.0	17.0	30.0	21.5	88.0	271.5	1.9
MILLS/BORING MILL	LUCAS JIG MILL 4418120	335.2	296.0	272.0	316.0	372.0	368.0	1,959.2	11.4	335.2	296.0	272.0	316.0	372.0	368.0	1,959.2	13.7
	LUCAS JIG MILL 41872	143.5	119.5	159.0	164.5	131.0	98.1	815.6	4.8	119.5	114.0	140.5	143.0	121.0	93.5	731.5	5.1
	FOSMATIC JIG BORE	157.0	228.5	273.0	286.0	274.0	252.5	1,471.0	8.6	157.0	202.5	273.0	283.0	268.0	252.5	1,436.0	10.0
MACHINING CENTERS	SUNDSTRAND OM1 MACH. CTR. 1	0.0	0.0	8.0	75.0	170.5	49.5	303.0	1.8	0.0	0.0	8.0	72.5	159.5	49.5	289.5	2.0
	SUNDSTRAND OM1 MACH. CTR. 2	156.0	134.5	80.5	186.0	152.0	147.5	856.5	5.0	116.5	132.0	80.5	141.0	124.5	91.0	685.5	4.8
	SUNDSTRAND OM1 MACH. CTR. 3	0.0	90.0	269.3	167.5	161.0	139.5	827.3	4.8	0.0	81.0	269.3	110.5	85.0	101.0	646.8	4.5
	SUNDSTRAND OM1 MACH. CTR. 4	283.7	164.5	68.5	0.0	0.0	0.0	516.7	3.0	224.5	117.5	68.5	0.0	0.0	0.0	410.5	2.9
	SUNDSTRAND OM3 MACH. CTR. 1	221.0	139.5	196.0	194.7	144.0	35.0	930.2	5.4	221.0	128.5	196.0	189.7	131.5	26.0	892.7	6.2
	SUNDSTRAND OM3 MACH. CTR. 2	227.0	180.0	50.5	178.8	116.5	109.5	872.3	5.1	119.8	119.5	60.5	145.3	75.0	62.5	582.6	4.1
	BRIDGEPORT MACH. CTR.	89.0	82.5	128.0	65.5	103.0	46.5	514.5	3.0	87.6	70.6	107.2	48.0	98.5	31.6	443.5	3.1
	MONARCH VMC 200 MACH. CTR.	192.8	210.0	133.5	132.0	267.0	191.5	1,126.8	6.6	152.3	155.0	133.5	100.0	185.0	49.5	775.3	5.4
	BROWN & SHARPE MACH. CTR.	91.2	39.5	5.0	16.5	0.0	103.7	255.9	1.5	71.7	26.4	2.7	12.5	0.0	86.2	199.5	1.4
	KEARNEY TRECKER MOD II MACH. CTR.	236.0	159.0	131.5	120.0	95.0	41.5	783.0	4.6	209.0	137.5	131.5	109.0	90.5	36.5	714.0	5.0
GRINDER	INGERSOL CUTTER GRINDER	90.5	144.0	119.0	123.0	118.5	96.0	691.0	4.0	50.0	100.0	77.0	78.0	79.0	62.0	446.0	3.1
ROUTER	EKSTROM CARLSON ENGRAVER ROUTER	101.0	152.0	121.0	120.0	68.0	156.0	718.0	4.2	101.0	152.0	121.0	112.0	68.0	156.0	710.0	5.0
	TOTAL	3,000.6	2,903.0	2,699.0	2,677.0	3,098.6	2,755.5	17,133.7	100.0	2,487.4	2,444.9	2,452.9	2,288.0	2,509.1	2,134.0	14,316.3	100.0

FIGURE A-36
N/C MACHINE UTILIZATION
NAVAIREWORKFAC PENSACOLA
1 JUL 77 - 31 DEC 77

MACHINE/ PROCESS	N/C MACHINE	PRODUCTION TIME (HOURS)								CUTTING TIME (HOURS)							
		JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	%
LATHES	JONES & LAMSON 4-AXIS LATHE	89.0	18.0	8.0	138.0	142.5	41.5	437.0	4.0	69.0	14.0	8.0	111.0	75.0	23.0	300.0	3.7
	WADELL 2-AXIS LATHE	31.0	108.0	164.0	176.0	166.0	8.0	653.0	6.0	31.0	80.0	118.0	129.0	156.5	7.0	521.5	6.4
	WARNER & SWASEY MOD 1 AB LATHE	156.5	34.5	160.0	182.0	160.0	111.7	804.7	7.3	130.2	24.5	149.0	148.2	140.0	111.2	703.1	8.7
	WARNER & SWASEY MOD 0 AB LATHE	65.0	124.0	173.0	148.0	142.0	160.0	812.0	7.4	54.0	111.3	135.0	148.0	142.0	159.5	749.8	9.3
42 DRILLS	TAPE-O-MATIC DRILL	77.5	60.0	49.0	36.0	48.0	133.0	403.5	3.7	70.0	51.0	49.0	36.0	48.0	133.0	387.0	4.8
	TAPE O-MATIC DRILL	0.0	0.0	32.0	73.0	206.0	32.0	343.0	3.1	0.0	0.0	32.0	73.0	203.0	32.0	340.0	4.2
	NUMERIMATE DRILL	0.0	0.0	0.0	4.0	6.0	0.0	10.0	0.1	0.0	0.0	0.0	4.0	6.0	0.0	10.0	0.1
	ROUTER/DRILL 2-AXIS	142.0	136.5	62.0	112.0	69.0	90.0	611.5	5.6	71.0	87.5	37.0	73.0	46.0	54.0	368.5	4.5
PUNCH	FABRAMATIC 2-AXIS	98.5	98.2	82.5	88.0	16.0	34.0	417.2	3.8	84.0	72.2	54.0	59.5	4.0	28.0	301.7	3.7
MILLS/BORING MILL	BRIDGEPORT PROFILER	109.7	100.0	83.5	19.8	0.0	38.3	351.3	3.2	103.7	82.5	82.5	5.8	0.0	17.0	291.5	3.6
	3-AXIS JIG BORER	0.0	23.0	57.3	94.5	40.7	73.0	288.5	2.6	0.0	8.0	32.9	86.9	35.3	67.0	230.1	2.8
MACHINING CENTERS	KEARNEY & TRECKER MOD II MACHINING CENTER	234.2	559.0	165.5	235.0	118.5	108.0	1,420.2	13.0	231.7	557.8	162.5	232.5	117.5	106.5	1,408.5	17.4
	KEARNEY & TRECKER MOD II MACHINING CENTER	178.0	100.2	72.1	156.7	18.2	56.0	581.2	5.3	169.0	93.4	65.6	115.0	15.7	34.5	493.2	6.1
	5-AXIS OM-3 MACHINING CENTER	258.3	87.2	312.0	259.0	158.0	171.8	1,246.3	11.4	226.7	58.7	180.0	181.5	54.3	126.5	827.7	10.2
	KEARNEY & TRECKER TURN-12 MACHINING CENTER	73.0	149.5	96.0	72.0	60.0	44.0	494.5	4.5	51.0	139.5	94.0	34.5	56.5	40.5	416.0	5.1
	4-AXIS OM-1 MACHINING CENTER	157.2	69.0	22.3	0.0	37.5	12.0	298.0	2.7	67.0	12.0	8.3	0.0	10.5	12.0	109.8	1.4
	4 AXIS OM-1 MACHINING CENTER	8.0	63.0	171.1	179.0	141.0	143.0	705.1	6.4	0.0	5.5	29.5	107.0	47.0	97.0	286.0	3.5
	MONARCH VMC-75	138.0	223.5	194.3	171.7	173.1	149.0	1,049.6	9.6	41.0	65.8	74.0	56.7	55.5	49.5	342.5	4.2
TUBE BENDER	3-AXIS TUBE BENDER	0.0	16.5	6.0	5.5	5.3	0.0	33.3	0.3	0.0	8.0	3.0	3.0	3.3	0.0	17.3	0.2
	TOTAL	1,815.9	1,970.1	1,910.6	2,150.2	1,707.8	1,405.3	10,959.9	100.0	1,399.3	1,471.7	1,314.3	1,604.6	1,216.1	1,098.2	8,104.2	100.0

FIG. A-37

N/C MACHINE UTILIZATION
 NAVAIREWORKFAC ALAMEDA
 1 JUL 77 — 31 DEC 77
 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/ PROCESS	MONTH (NUMBER OF WORKDAYS)							%
	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	
LATHES	353.6 (17.7)	639.8 (27.8)	335.9 (16.0)	423.5 (22.3)	655.9 (31.2)	426.9 (20.3)	2,835.6 (22.7)	43.7
DRILLS	106.3 (5.3)	116.3 (5.1)	74.7 (3.6)	40.0 (2.1)	132.9 (6.3)	99.6 (4.7)	569.8 (4.6)	8.8
PUNCH		56.0 (2.7)	96.0 (4.6)	0.0		16.0 (0.8)	168.0 (1.3)	2.6
MILLS/BORING MILL	349.9 (17.5)	503.2 (21.9)	337.3 (16.1)	349.5 (18.4)	519.7 (24.7)	81.0 (3.9)	2,140.6 (17.1)	33.0
MACHINING CENTERS	190.8 (9.5)	148.8 (6.5)	27.2 (1.3)	52.1 (2.7)	103.1 (4.9)	83.0 (4.0)	605.0 (4.8)	9.3
GRINDER				0.0			0.0	0.0
ROUTER		84.0 (3.7)	63.0 (3.0)	0.0		23.5 (1.1)	170.5 (1.4)	2.6
TOTAL	1,000.6 (50.0)	1,548.1 (67.3)	934.1 (44.5)	865.1 (45.5)	1,411.6 (67.2)	730.0 (34.8)	6,489.5 (51.9)	100.0

FIG. A-38

N/C MACHINE UTILIZATION
NAVAIREWORKFAC CHERRY POINT
1 JUL 77 — 31 DEC 77
CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/ PROCESS	MONTH (NUMBER OF WORKDAYS)							
	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	119.0 (6.0)	260.0 (11.3)	85.0 (4.0)	184.0 (9.7)	195.5 (9.3)	89.0 (4.2)	932.5 (7.5)	16.2
PUNCH	31.0 (1.6)	43.0 (1.9)	51.0 (2.4)	14.0 (0.7)	29.0 (1.4)	8.0 (0.4)	176.0 (1.4)	3.1
MILLS	190.5 (9.5)	304.0 (13.2)	362.5 (17.3)	230.0 (12.1)	261.5 (12.5)	195.5 (9.3)	1,544.0 (12.4)	26.8
MACHINING CENTERS	439.0 (22.0)	501.1 (21.8)	414.0 (19.7)	461.6 (24.3)	647.5 (30.8)	637.9* (30.4)	3,101.1 (24.8)	53.9
TOTAL	779.5 (39.0)	1,108.1 (48.2)	912.5 (43.5)	889.6 (46.8)	1,133.5 (54.0)	930.4 (44.3)	5,753.6 (46.0)	100.0

* MONARCH TC 1 ADDED 12/77

FIG. A-39

**N/C MACHINE UTILIZATION
NAVAIREWORKFAC JACKSONVILLE
1 JUL 77 — 31 DEC 77
CUTTING TIME (HOURS): TOTAL & PER WORKDAY**

MACHINE/ PROCESS	MONTH (NUMBER OF WORKDAYS)							
	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	97.5 (4.9)	144.5 (6.3)	164.0 (7.8)	91.0 (4.8)	111.3 (5.3)	102.0 (4.9)	710.3 (5.7)	16.3
DRILLS	9.0 (0.5)	0.0 (0.0)	8.0 (0.4)	12.0 (0.6)	0.0 (0.0)	0.0 (0.0)	29.0 (0.2)	0.7
MILLS	116.5 (5.8)	171.5 (7.5)	141.5 (6.7)	63.0 (3.3)	121.0 (5.8)	54.0 (2.6)	667.5 (5.3)	15.3
MACHINING CENTERS	666.5 (33.3)	804.5 (35.0)	334.1 (15.9)	524.5 (27.6)	309.0 (14.7)	309.5 (14.7)	2,948.1 (23.6)	67.7
TOTAL	889.5 (44.5)	1,120.5 (48.7)	647.6 (30.8)	690.5 (36.3)	541.3 (25.8)	465.5 (22.2)	4,354.9 (34.8)	100.0

FIG. A-40

N/C MACHINE UTILIZATION
NAVAIREWORKFAC NORFOLK
1 JUL 77 — 31 DEC 77

CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/ PROCESS	MONTH (NUMBER OF WORKDAYS)							
	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	310.8 (15.5)	431.2 (18.7)	362.4 (17.3)	371.2 (19.5)	322.0 (15.3)	508.8 (24.2)	2,306.4 (18.5)	21.8
DRILLS	224.4 (11.2)	187.6 (8.2)	236.7 (11.3)	215.6 (11.3)	211.3 (10.1)	230.5 (11.0)	1,306.1 (10.4)	12.4
MILLS/BORING MILL	59.1 (3.0)	161.6 (7.0)	86.1 (4.1)	78.2 (4.1)	107.3 (5.1)	102.6 (4.9)	594.9 (4.8)	5.6
MACHINING CENTERS	553.8 (27.7)	959.3 (41.7)	955.0 (45.5)	1,210.6 (63.7)	1,334.7 (63.6)	1,321.7 (62.9)	6,335.1 (50.7)	60.0
TUBE BENDER	—	—	—	0.0	16.8 (0.8)	—	16.8 (0.1)	0.2
TOTAL	1,148.1 (57.4)	1,739.7 (75.6)	1,640.2 (78.1)	1,875.6 (98.7)	1,992.1 (94.9)	2,163.6 (103.0)	10,559.3 (84.5)	100.0

FIG. A-41

N/C MACHINE UTILIZATION
 NAVAIREWORKFAC NORTH ISLAND
 1 JUL 77 — 31 DEC 77
 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/ PROCESS	MONTH (NUMBER OF WORKDAYS)							
	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	281.3 (14.1)	309.9 (13.5)	239.7 (11.4)	212.0 (11.2)	410.1 (19.5)	335.2 (16.0)	1,788.2 (14.3)	12.5
DRILL	184.0 (9.2)	184.0 (8.0)	168.0 (8.0)	159.0 (8.4)	168.0 (8.0)	192.0 (9.1)	1,055.0 (8.4)	7.4
PUNCHES	57.0 (2.9)	118.5 (5.2)	104.0 (5.0)	56.5 (3.0)	73.5 (3.5)	141.0 (6.7)	550.5 (4.4)	3.8
MILLS/BORING MILL	611.7 (30.6)	612.5 (26.6)	685.5 (32.6)	742.0 (39.1)	761.0 (36.2)	714.0 (34.0)	4,126.7 (33.0)	28.8
MACHINING CENTERS	1,202.4 (60.1)	968.0 (42.1)	1,057.7 (50.4)	928.5 (48.9)	949.5 (45.2)	533.8 (25.4)	5,639.9 (45.1)	39.4
GRINDER	50.0 (2.5)	100.0 (4.3)	77.0 (3.7)	78.0 (4.1)	79.0 (3.8)	62.0 (3.0)	446.0 (3.6)	3.1
ROUTER	101.0 (5.1)	152.0 (6.6)	121.0 (5.8)	112.0 (5.9)	68.0 (3.2)	156.0 (7.4)	710.0 (5.7)	5.0
TOTAL	2,487.4 (124.4)	2,444.9 (106.3)	2,452.9 (116.8)	2,288.0 (120.4)	2,509.1 (119.5)	2,134.0 (101.6)	14,316.3 (114.5)	100.0

FIG. A-42

N/C MACHINE UTILIZATION
 NAVAIREWORKFAC PENSACOLA
 1 JUL 77 — 31 DEC 77
 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/ PROCESS	MONTH (NUMBER OF WORKDAYS)							
	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	284.2 (14.2)	229.8 (10.0)	410.0 (19.5)	536.2 (28.2)	513.5 (24.5)	300.7 (14.3)	2,274.4 (18.2)	28.1
DRILLS	141.0 (7.1)	138.5 (6.0)	118.0 (5.6)	186.0 (9.8)	303.0 (14.4)	219.0 (10.4)	1,105.5 (8.8)	13.6
PUNCH	84.0 (4.2)	72.2 (3.1)	54.0 (2.6)	59.5 (3.1)	4.0 (0.2)	28.0 (1.3)	301.7 (2.4)	3.7
MILLS/BORING MILL	103.7 (5.2)	90.5 (3.9)	115.4 (5.5)	92.7 (4.9)	35.3 (1.7)	84.0 (4.0)	521.6 (4.2)	6.4
MACHINING CENTERS	786.4 (39.3)	932.7 (40.6)	613.9 (29.2)	727.2 (38.3)	357.0 (17.0)	466.5 (22.2)	3,883.7 (31.1)	47.9
TUBE BENDER	0.0 (0.0)	8.0 (0.3)	3.0 (0.1)	3.0 (0.2)	3.3 (0.2)	0.0 (0.0)	17.3 (0.1)	0.2
TOTAL	1,399.3 (70.0)	1,471.7 (64.0)	1,314.3 (62.6)	1,604.6 (84.5)	1,216.1 (57.9)	1,098.2 (52.3)	8,104.2 (64.8)	100.0

FIG. A-43

N/C MACHINE UTILIZATION
NAVAIREWORKFAC ALAMEDA
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	PRODUCTION TIME ¹ (HOURS)				CUTTING TIME ¹ (HOURS)			
	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	1,635.0	1,918.7	3,553.7	38.5	1,329.3	1,506.3	2,835.6	43.7
DRILLS	488.0	461.7	949.7	10.3	297.3	272.5	569.8	8.8
PUNCH	152.0	34.3	186.3	2.0	152.0	16.0	168.0	2.6
MILLS/BORING MILL	1,944.2	1,399.6	3,343.8	36.2	1,190.4	950.2	2,140.2	33.0
MACHINING CENTERS	477.8	496.4	974.2	10.6	366.8	238.2	605.0	9.3
GRINDER					0.0	0.0	0.0	0.0
ROUTER	180.5	42.5	223.0	2.4	147.0	23.5	170.5	2.6
TOTAL	4,877.5	4,353.2	9,230.7	100.0	3,482.8	3,006.7	6,489.5	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-44

N/C MACHINE UTILIZATION
NAVAIREWORKFAC CHERRY POINT
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	PRODUCTION TIME ¹ (HOURS)				CUTTING TIME ¹ (HOURS)			
	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	519.5	539.0	1,058.5	15.7	464.0	468.5	932.5	16.2
PUNCH	184.0	82.0	266.0	3.9	125.0	51.0	176.0	3.1
MILLS	966.0	814.0	1,780.0	26.4	857.0	687.0	1,544.0	26.8
MACHINING CENTERS	1,573.2	2,066.5	3,639.7	54.0	1,354.1	1,747.0	3,101.1	53.9
TOTAL	3,242.7	3,501.5	6,744.2	100.0	2,800.1	2,953.5	5,753.6	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-45

N/C MACHINE UTILIZATION
NAVAIREWORKFAC JACKSONVILLE
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	PRODUCTION TIME ¹ (HOURS)				CUTTING TIME ¹ (HOURS)				EXPENDED HOURS ²			
	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	566.5	507.0	1,073.5	17.0	406.0	304.3	710.3	16.3	186.5	256.9	443.4	15.6
DRILLS	86.0	216.0	302.0	4.8	17.0	12.0	29.0	0.7	43.0	84.9	127.9	4.5
MILLS	712.9	553.0	1,265.9	20.1	429.5	238.0	667.5	15.3	156.8	248.1	404.9	14.2
MACHINING CENTERS	2,175.6	1,479.7	3,655.3	58.1	1,805.1	1,143.0	2,948.1	67.7	1,223.6	646.7	1,870.3	65.7
TOTAL	3,541.0	2,755.7	6,296.7	100.0	2,657.6	1697.3	4,354.9	100.0	1,609.9	1,236.6	2,846.5	100.0

¹ N/C MACHINE UTILIZATION REPORT

² GEOGRAPHICAL AREA REPORT

FIG. A-46

N/C MACHINE UTILIZATION
NAVAIREWORKFAC NORFOLK
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	PRODUCTION TIME ¹ (HOURS)				CUTTING TIME ¹ (HOURS)			
	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	1,525.3	1,511.9	3,037.2	22.6	1,104.4	1,202.0	2,306.4	21.8
DRILLS	792.3	841.2	1,633.5	12.1	648.7	657.4	1,306.1	12.4
MILLS/BORING MILL	367.7	346.3	714.0	5.3	306.8	288.1	594.9	5.6
MACHINING CENTERS	3,309.3	4,690.4	7,999.7	59.4	2,468.1	3,867.0	6,335.1	60.0
TUBE BENDER	—	77.5	77.5	0.6	—	16.8	16.8	0.2
TOTAL	5,994.6	7,467.3	13,461.9	100.0	4,528.0	6,031.3	10,559.3	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-47

N/C MACHINE UTILIZATION
NAVAIREWORKFAC NORTH ISLAND
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	PRODUCTION TIME ¹ (HOURS)				CUTTING TIME ¹ (HOURS)			
	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	1,268.9	1,521.8	2,790.7	16.3	830.9	957.3	1,788.2	12.5
DRILL	536.0	519.0	1,055.0	6.2	536.0	519.0	1,055.0	7.4
PUNCH	309.5	337.5	647.0	3.8	279.5	271.0	550.5	3.8
MILLS/BORING MILL	1,983.7	2,262.1	4,245.8	24.8	1,909.7	2,217.0	4,126.7	28.8
MACHINING CENTERS	3,777.0	3,209.2	6,986.2	40.8	3,228.1	2,411.8	5,639.9	39.4
GRINDER	353.5	337.5	691.0	4.0	227.0	219.0	446.0	3.1
ROUTER	374.0	344.0	718.0	4.2	374.0	336.0	710.0	5.0
TOTAL	8,602.6	8,531.1	17,133.7	100.0	7,385.2	6,931.1	14,316.3	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-48

N/C MACHINE UTILIZATION
NAVAIREWORKFAC PENSACOLA
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	PRODUCTION TIME ¹ (HOURS)				CUTTING TIME ¹ (HOURS)			
	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	1,131.0	1,575.7	2,706.7	24.7	924.0	1,350.4	2,274.4	28.1
DRILLS	559.0	809.0	1,368.0	12.5	397.5	708.0	1,105.5	13.6
PUNCH	279.2	138.0	417.2	3.8	210.2	91.5	301.7	3.7
MILLS/BORING MILL	373.5	266.3	639.8	5.8	309.6	212.0	521.6	6.4
MACHINING CENTERS	3,331.4	2,463.5	5,794.9	52.9	2,333.0	1,550.7	3,883.7	47.9
TUBE BENDER	22.5	10.8	33.3	0.3	11.0	6.3	17.3	0.2
TOTAL	5,696.6	5,263.3	10,959.9	100.0	4,185.3	3,918.9	8,104.2	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-49

N/C MACHINE UTILIZATION
 PRODUCTION TIME (HOURS)
 1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	NAVAIREWORKFAC							
	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
LATHES	3,553.7	1,058.5	1,073.5	3,037.2	2,790.7	2,706.7	14,220.3	22.3
DRILLS	949.7	—	302.0	1,633.5	1,055.0	1,368.0	5,308.2	8.3
PUNCHES	186.3	266.0	—	—	647.0	417.2	1,516.5	2.4
MILLS/BORING MILL	3,343.8	1,780.0	1,265.9	714.0	4,245.8	639.8	11,989.3	18.8
MACHINING CENTERS	947.2	3,639.7	3,655.3	7,999.7	6,986.2	5,794.9	29,050.0	45.5
GRINDERS	—	—	—	—	691.0	—	691.0	1.1
ROUTERS	223.0	—	—	—	718.0	—	941.0	1.5
TUBE BENDERS	—	—	—	77.5	—	33.3	110.8	0.2
TOTAL	9,230.7	6,744.2	6,296.7	13,461.9	17,133.7	10,959.9	63,827.1	100.0
%	14.5	10.6	9.9	21.1	26.8	17.2	100.0	—

FIG. A-50

N/C MACHINE UTILIZATION
CUTTING TIME (HOURS)
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	NAVAIREWORKFAC							
	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
LATHES	2,835.6	932.5	710.3	2,306.4	1,788.2	2,274.4	10,847.4	21.9
DRILLS	569.8	—	29.0	1,306.1	1,055.0	1,105.5	4,065.4	8.2
PUNCHES	168.0	176.0	—	—	550.5	301.7	1,196.2	2.4
MILLS/BORING MILL	2,140.6	1,544.0	667.5	594.9	4,126.7	521.6	9,595.3	19.4
MACHINING CENTERS	605.0	3,101.1	2,948.1	6,335.1	5,639.9	3,883.7	22,512.9	45.4
GRINDERS	—	—	—	—	446.0	—	446.0	0.9
ROUTERS	170.5	—	—	—	710.0	—	880.5	1.8
TUBE BENDERS	—	—	—	16.8	—	17.3	34.1	0.1
TOTAL	6,489.5	5,753.6	4,354.9	10,559.3	14,316.3	8,104.2	49,577.8	100.0
%	13.1	11.6	8.8	21.3	28.9	16.3	100.0	—

FIGURE A-51
MACHINE USAGE
NAVAIREWORKFAC JACKSONVILLE
1 JUL 77 – 31 DEC 77
EXPENDED HOURS: TOTAL AND PER WORK DAY

MONTH (NUMBER OF WORKDAYS) MACHINE/PROCESS	CONVENTIONAL								NUMERICAL CONTROL							
	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES/AUTOMATIC BAR MACHINE	1,646.2 (82.3)	1,728.0 (75.1)	1,988.7 (94.7)	1,589.0 (83.6)	1,819.2 (86.6)	1,525.1 (72.6)	10,296.2 (82.4)	29.2	63.4 (3.2)	40.5 (1.8)	82.6 (3.9)	15.2 (0.8)	182.0 (8.7)	59.7 (2.8)	443.4 (3.5)	15.6
AUTOMATIC SCREW MACHINES	121.9 (6.1)	14.2 (0.6)	7.0 (0.3)	37.3 (2.0)	—	36.8 (1.8)	217.2 (1.7)	0.6	—	—	—	—	—	—	—	—
DRILLS	364.7 (18.2)	767.5 (33.4)	555.3 (26.4)	528.5 (27.8)	698.1 (33.2)	405.5 (19.2)	3,319.6 (26.6)	9.4	12.0 (0.6)	22.9 (1.0)	8.1 (0.4)	19.1 (1.0)	48.2 (2.3)	17.6 (0.8)	127.9 (1.0)	4.5
BORERS/BORING MACHINE	—	19.9 (0.9)	42.2 (2.0)	17.6 (0.9)	8.0 (0.4)	44.9 (2.1)	132.6 (1.1)	0.4	—	—	—	—	—	—	—	—
HONES	40.8 (2.0)	119.8 (5.2)	358.4 (17.1)	207.1 (10.9)	150.7 (7.2)	95.6 (4.6)	972.4 (7.8)	2.8	—	—	—	—	—	—	—	—
GRINDERS	1,580.1 (79.0)	2,673.5 (116.2)	2,922.0 (139.1)	2,813.4 (148.1)	2,467.9 (117.5)	1,831.2 (87.2)	14,288.1 (114.3)	40.6	—	—	—	—	—	—	—	—
ELECTRICAL DISCHARGE MACHINES	126.4 (6.3)	258.7 (11.2)	131.4 (6.3)	294.7 (15.5)	183.7 (8.7)	165.9 (7.9)	1,160.8 (9.3)	3.3	—	—	—	—	—	—	—	—
ELECTRON BEAM WELDERS	56.6 (2.8)	163.4 (7.1)	71.3 (3.4)	172.7 (9.1)	229.4 (10.9)	100.8 (4.8)	794.2 (6.4)	2.3	—	—	—	—	—	—	—	—
MILLS/BORING MILL	282.8 (14.1)	438.4 (19.1)	615.8 (29.3)	330.9 (17.4)	337.1 (16.1)	308.5 (14.7)	2,313.5 (18.5)	6.6	22.3 (1.1)	56.7 (2.5)	77.8 (3.7)	139.0 (7.3)	47.7 (2.3)	61.4 (2.9)	404.9 (3.2)	14.2
MACHINING CENTERS	—	—	—	—	—	—	—	—	307.7 (15.4)	495.6 (21.5)	420.3 (20.0)	281.0 (14.8)	221.4 (10.5)	144.3 (6.9)	1,870.3 (15.0)	65.7
PLANER	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SHAPERS	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BROACH	0.4 (—)	36.6 (1.6)	3.7 (0.2)	9.9 (0.5)	0.9 (—)	0.9 (—)	52.4 (0.4)	0.1	—	—	—	—	—	—	—	—
DEBURRING MACHINE	138.6 (6.9)	199.7 (8.7)	187.5 (8.9)	182.4 (9.6)	197.5 (9.4)	126.8 (6.0)	1,032.5 (8.3)	2.9	—	—	—	—	—	—	—	—
LAPPING MACHINE	6.3 (0.3)	12.4 (0.5)	—	—	—	—	18.7 (0.1)	0.1	—	—	—	—	—	—	—	—
HANDWORK	98.7 (4.9)	152.0 (6.6)	78.1 (3.7)	104.4 (5.5)	89.9 (4.3)	109.1 (5.2)	632.2 (5.1)	1.8	—	—	—	—	—	—	—	—
TOTAL	4,463.5 (223.2)	6,584.1 (286.3)	6,961.4 (331.5)	6,287.9 (330.9)	6,182.4 (294.4)	4,751.1 (226.2)	35,230.4 (281.8)	100.1	405.4 (20.3)	615.7 (26.8)	588.8 (28.0)	454.3 (23.9)	499.3 (23.8)	283.0 (13.5)	2,846.5 (22.8)	100.0

DATA SOURCE: GEOGRAPHICAL AREA REPORT

FIG. A-52

MACHINE USAGE
NAVAIREWORKFAC JACKSONVILLE
1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	CONVENTIONAL				NUMERICAL CONTROL			
	EXPENDED HOURS			%	EXPENDED HOURS			%
	4th QTR FY 77	1st QTR FY 78	TOTAL		4th QTR FY 77	1st QTR FY 78	TOTAL	
LATHES/AUTOMATIC BAR MACHINE	5,362.9	4,933.3	10,296.2	29.2	186.5	256.9	443.4	15.6
AUTOMATIC SCREW MACHINES	143.1	74.1	217.2	0.6				
DRILLS	1,687.5	1,632.1	3,319.6	9.4	43.0	84.9	127.9	4.5
BORERS/BORING MACHINE	62.1	70.5	132.6	0.4				
HONES	519.0	453.4	972.4	2.8				
GRINDERS	7,175.6	7,112.5	14,288.1	40.6				
ELECTRICAL DISCHARGE MACHINES	516.5	644.3	1,160.8	3.3				
ELECTRON BEAM WELDERS	291.3	502.9	794.2	2.3				
MILLS/BORING MILL	1,337.0	976.5	2,313.5	6.6	156.8	248.1	404.9	14.2
MACHINING CENTERS					1,223.6	646.7	1,870.3	65.7
PLANER								
SHAPERS								
BROACH	40.7	11.7	52.4	0.1				
DEBURRING MACHINE	525.8	506.7	1,032.5	2.9				
LAPPING MACHINE	18.7	—	18.7	0.1				
HANDWORK	328.8	303.4	632.2	1.8				
TOTAL	18,009.0	17,221.4	35,230.4	100.1	1,609.9	1,236.6	2,846.5	100.0

TABLE A-1
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
AIRCRAFT EQUIPMENT/WIRING:														
- MODIFY	12.85	4.2	25.97	17.6	1.63	0.5	15.39	3.5	47.41	11.0	15.22	4.8	118.47	6.1
- REPAIR	88.82	29.0	14.18	9.6	7.15	2.4	45.27	10.3	73.48	17.1	37.56	11.9	266.46	13.8
- REPLACE	3.54	1.2	3.80	2.6	1.30	0.4	3.85	0.9	24.83	5.8	26.12	8.3	63.44	3.3
- INSTALL			9.83	6.7	0.80	0.3	15.81	3.6	64.31	15.0	14.43	4.6	105.18	5.4
CHECK/TEST:														
- OPERATIONAL	8.22	2.7	16.39	11.1	26.17	8.7	21.10	4.8	45.47	10.6	24.22	7.7	141.57	7.3
- DITMCO <u>1/</u>	3.10	1.0	5.21	3.5	6.25	2.1	4.81	1.1	10.50	2.4	5.58	1.8	35.45	1.8
- OTHER AUTOMATIC TEST <u>1/</u> EQUIPMENT	1.16	0.4	1.80	1.2	13.14	4.4	37.63	8.6	15.11	3.5	2.19	0.7	71.03	3.7
					0.23	0.1	9.41	2.1	3.80	0.9	3.49	1.1	24.24	1.3
CORRECT DISCREPANCIES	3.93	1.3	3.38	2.3			9.28	2.1	7.10	1.7	0.55	0.2	42.89	2.2
EVALUATE	7.22	2.4	2.11	1.4	16.63	5.5								
REPAIR	10.17	3.3	11.15	7.6	39.64	13.2	67.36	15.3	18.63	4.3	31.60	10.0	178.55	9.2
REWORK	38.16	12.5	15.21	10.3	43.51	14.5	25.86	5.9	9.59	2.2	46.13	14.7	178.46	9.2
OVERHAUL	27.42	9.0	6.37	4.3	42.56	14.2	24.49	5.6	7.31	1.7	65.71	20.9	173.86	9.0

TABLE A-1
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 2 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
CALIBRATE	20.79	6.8	0.58	0.4	17.80	5.9	20.17	4.6	2.05	0.5	0.66	0.2	62.05	3.2
CROSS CHECK	0.36	0.1	0.39	0.3	2.30	0.8	1.62	0.4	1.44	0.3	0.02	0.0	6.13	0.3
CERTIFY	2.69	0.9	0.80	0.5	5.89	2.0	6.36	1.4	6.98	1.6	1.32	0.4	24.04	1.2
TEST	18.83	6.2	3.00	2.0	15.00	5.0	22.23	5.1	9.23	2.1	7.71	2.5	76.00	3.9
DISASSEMBLE	12.83	4.2	5.46	3.7	15.36	5.1	19.45	4.4	11.02	2.6	6.59	2.1	70.71	3.7
ASSEMBLE	16.50	5.4	3.57	2.4	26.30	8.8	28.30	6.4	9.82	2.3	8.87	2.8	93.36	4.8
COMPLY WITH TECHNICAL DIRECTIVES	7.38	2.4	3.43	2.3	8.10	2.7	40.88	9.3	28.50	6.6	1.99	0.6	90.28	4.7
HERMETICALLY SEALED INSTRU- MENTS AND COMPONENTS:														
- UNSEALING	2.28	0.7	2.00	1.4	0.65	0.2	3.68	0.8	1.01	0.2	0.24	0.1	9.86	0.5
- LEAK-TESTING	2.58	0.8	0.92	0.6	1.00	0.3	0.93	0.2	0.99	0.2	3.44	1.1	9.86	0.5
- PURGING	0.75	0.2	0.74	0.5	0.80	0.3	1.13	0.3	0.10	0.0	0.99	0.3	4.51	0.2
- FILLING	0.45	0.1	0.92	0.6	0.50	0.2	2.21	0.5	0.32	0.1	0.21	0.1	4.61	0.2
- RESEALING	3.30	1.1	0.56	0.4	0.75	0.2							4.61	0.2
- FOG-TESTING	0.40	0.1			0.30	0.1	0.22	0.1					0.92	0.0

TABLE A-1
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 4 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
TOTAL	306.03	100.0	147.37	100.0	300.27	100.0	438.94	100.0	429.84	100.0	314.63	100.0	1,937.08	100.0
1/ SEE ALSO TABLE A-4 - "TESTING"														

TABLE A-3
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 1 OF 5

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
PHOTO TEMPLATE			0.40	0.2	2.25	1.1					14.00	6.6	16.65	1.3
PHOTO ENGRAVING														
MANUFACTURE KIRKSITE DIES:														
- DROP HAMMER			0.54	0.3									0.54	0.0
- PUNCH PRESS													0.18	0.0
- STRETCH PRESS			0.18	0.1									0.36	0.0
- HYDROFORM/ROLL FORM			0.36	0.2										
FABRICATE METAL PARTS:														
- BAND SAW			1.00	0.5	1.50	0.7							2.50	0.2
- DROP HAMMER	1.36	1.0	0.90	0.5			0.17	0.1					2.43	0.2
- PUNCH PRESS	1.52	1.1	0.36	0.2	4.75	2.3	0.35	0.2	2.09	0.6	1.40	0.7	10.47	0.8
- ROUTER	3.02	2.2	0.70	0.4	1.65	0.8	0.02	0.0	3.96	1.2	2.80	1.3	12.15	0.9
- RADIAL DRAW FORMER					2.10	1.0			3.63	1.1			5.73	0.4
- BELT SANDER			0.40	0.2									0.40	0.0
- STRETCH PRESS	0.16	0.1	0.18	0.1	2.10	1.0	0.35	0.2			0.70	0.3	3.49	0.3

TABLE A-3
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 2 OF 5

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
- SPINNING LATHE	0.38	0.3	0.18	0.1									0.56	0.0
- HYDROFORM/ROLL FORM	4.10	2.9	1.44	0.7	1.10	0.5	0.51	0.2			0.70	0.3	7.85	0.6
- TURRET PUNCH	6.16	4.4			4.66	2.3	0.47	0.2	3.74	1.1	1.62	0.8	16.65	1.3
- SHEAR	2.14	1.5	1.31	0.7	13.86	6.8	6.36	3.0	9.97	3.1	5.07	2.4	38.71	3.0
- BRAKE	4.97	3.6	1.69	0.9	10.88	5.3	5.65	2.7	6.41	2.0	3.67	1.7	33.27	2.6
- DRILL					1.40	0.7							1.40	0.1
LAYOUT					3.00	1.5							3.00	0.2
MANUFACTURE PLASTER PATTERNS AND FORMS			0.54	0.3			0.02	0.0	0.35	0.1			0.91	0.1
HEAT TREAT	9.00	6.4	1.26	0.6									10.26	0.8
PACK ALUMINIZE			0.72	0.4									0.72	0.1
METAL SPRAY:														
- PREPARING FOR SPRAY			1.80	0.9									1.80	0.1
- METAL SPRAYING			0.30	0.2									0.30	0.0
- CLEANING/MASKING			0.90	0.5									0.90	0.1

TABLE A-3
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 3 OF 5

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
RIGID METAL TUBING:														
- MANUFACTURE	0.85	0.6	2.90	1.5	3.00	1.5							6.75	0.5
- REPAIR	3.00	2.1	0.70	0.4	0.34	0.2			0.21	0.1			4.25	0.3
FLEXIBLE HOSE:														
- MANUFACTURE			2.80	1.4	3.00	1.5							5.80	0.4
- REPAIR			0.70	0.4							1.40	0.7	2.10	0.2
INCIDENTAL TO WELDING:														
- GRINDING	9.87	7.1	5.70	2.9	5.25	2.6	1.66	0.8	8.31	2.6	1.39	0.7	32.18	2.5
- PATCHING	0.85	0.6	4.71	2.4	2.26	1.1	1.31	0.6	3.91	1.2	3.61	1.7	16.65	1.3
- RIVETING	9.76	7.0	1.59	0.8	5.10	2.5	1.01	0.5	2.59	0.8	9.52	4.5	29.57	2.3
- BLENDING	3.46	2.5	2.65	1.3	2.67	1.3	0.34	0.2	3.43	1.1	1.18	0.6	13.73	1.1
- DIE CHECKING	0.56	0.4	0.53	0.3	1.73	0.8	0.33	0.2	14.25	4.4	1.05	0.5	18.45	1.4
REPAIR/REPLACE:														
- SKIN PANELS	3.56	2.6	8.05	4.1	21.42	10.5	24.70	11.6	15.94	4.9	17.61	8.3	91.28	7.1
- RIBS	2.81	2.0	8.28	4.2	8.42	4.1	6.69	3.2	14.75	4.5	9.24	4.4	50.19	3.9

TABLE A-3
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 4 OF 5

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
- STRINGERS	2.56	1.8	5.52	2.8	6.10	3.0	7.19	3.4	14.68	4.5	6.12	2.9	42.17	3.3
- SPARS	6.51	4.7	3.85	2.0	3.42	1.7	3.56	1.7	7.83	2.4	11.25	5.3	36.42	2.8
- FITTINGS	2.00	1.4	6.24	3.2	7.48	3.7	13.50	6.4	7.31	2.2	10.46	4.9	46.99	3.6
MANUFACTURE/INSTALL:														
- STRUCTURAL REPAIR PARTS	9.11	6.5	39.49	20.1	19.50	9.6	43.93	20.7	14.50	4.5	24.33	11.5	150.86	11.7
REPAIR/SEAL INTEGRAL FUEL CELLS	12.83	9.2	2.96	1.5	10.20	5.0	7.49	3.5	3.35	1.0	7.51	3.5	44.34	3.4
REMOVE/TREAT CORROSION	18.50	13.3	4.46	2.3	16.22	8.0	14.93	7.0	31.89	9.8	30.85	14.6	116.85	9.1
SPOT/TACK WELDING ON:														
- STEEL			2.42	1.2			0.80	0.4	0.28	0.1			3.50	0.3
- STAINLESS STEEL	0.29	0.2	3.17	1.6			0.35	0.2					3.81	0.3
REPAIR/MODIFY:														
- AILERONS	0.31	0.2	2.07	1.1	4.37	2.1	0.18	0.1	2.53	0.8	0.84	0.4	10.30	0.8
- FLAPS	0.31	0.2	2.81	1.4	4.59	2.3	2.01	0.9	3.01	0.9	0.84	0.4	13.57	1.1
- SLATS	0.31	0.2	0.24	0.1	0.17	0.1	0.33	0.2	0.50	0.2	0.45	0.2	2.00	0.2
- FINS	0.71	0.5	0.56	0.3	1.23	0.6	5.76	2.7	2.80	0.9	1.74	0.8	12.80	1.0

TABLE A-3
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 5 OF 5

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
- STABILIZERS	1.91	1.4	6.34	3.2	3.86	1.9	5.05	2.4	7.94	2.4	1.65	0.8	26.75	2.1
- VENTRAL FINS	0.31	0.2	2.99	1.5	0.63	0.3	0.18	0.1	1.97	0.6	0.84	0.4	6.92	0.5
- LEADING EDGES	0.31	0.2	2.11	1.1	3.86	1.9	3.03	1.4	1.93	0.6	2.09	1.0	13.33	1.0
- BONDED PANELS	0.71	0.5	0.76	0.4			1.26	0.6	1.79	0.5	0.45	0.2	4.97	0.4
- FLOOR BOARDS	1.56	1.1	2.70	1.4	0.50	0.2	0.18	0.1	1.25	0.4	1.05	0.5	7.24	0.6
- ACCESS PANELS	2.47	1.8	8.97	4.6	9.73	4.8	3.37	1.6	3.31	1.0	1.99	0.9	29.84	2.3
- OTHER LAMINATED/ HONEYCOMB STRUCTURES	0.93	0.7	1.65	0.8	1.06	0.5	15.19	7.2	3.88	1.2	0.41	0.2	23.12	1.8
COMPLY WITH TECHNICAL DIRECTIVES	10.37	7.4	43.54	22.1	8.64	4.2	33.43	15.8	121.11	37.2	34.13	16.1	251.22	19.5
REPAIR FIBREGLOSS									0.24	0.1			0.24	0.0
MISC. SHORING/ADJUSTMENTS							0.36	0.2					0.36	0.0
TOTAL	139.54	100.0	196.62	100.0	204.00	100.0	212.02	100.0	325.64	100.0	211.96	100.0	1,289.78	100.0

TABLE A- 4
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 1 OF 2

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: TESTING

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
NON-DESTRUCTIVE TESTING:														
- DYE PENETRANT									2.45	2.9			2.45	0.4
- MAGNAFLUX					5.42	7.1	1.50	1.4	2.49	2.9	3.60	4.1	13.01	2.4
- ZYGLO/FLUORESCENT PENETRANT					8.30	10.9	3.00	2.8	6.40	7.6	4.50	5.1	22.20	4.0
- ULTRASONIC					2.84	3.7	1.25	1.2	0.19	0.2	3.60	4.1	7.88	1.4
- RADIOGRAPHIC					1.00	1.3	4.00	3.8			4.50	5.1	9.50	1.7
- EDDY CURRENT					2.45	3.2	1.00	0.9	0.07	0.1	1.80	2.0	5.32	1.0
OPERATIONAL TESTING (INCL. TEST CELLS)	44.30	32.9	35.00	57.4	21.60	28.4	57.00	53.7	31.02	36.6			188.92	34.3
AUTOMATIC TEST EQUIPMENT:														
- DITMCO ^{1/}	0.70	0.5					3.20	3.0					3.90	0.7
- NARF-5500 ^{1/}			0.96	1.6									0.96	0.2
- OTHER ^{1/}	17.32	12.8	11.04	18.1			4.05	3.8	17.40	20.5			49.81	9.0
GROUND CHECK:														
- ENGINES	14.00	10.4	1.20	2.0	9.00	11.8	0.54	0.5	4.19	4.9	6.38	7.2	35.31	6.4

TABLE A-4
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 2 OF 2

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: TESTING

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
- AIRCRAFT	7.00	5.2	4.25	7.0	12.60	16.6	2.70	2.5	14.65	17.3	36.13	41.1	77.33	14.0
- ELECTRICAL	7.00	5.2	1.70	2.8	9.00	11.8	2.70	2.5	5.56	6.6	14.95	17.0	40.91	7.4
- ELECTRONIC	21.23	15.7	0.85	1.4	1.80	2.4	4.86	4.6			12.55	14.3	41.29	7.5
ENGINE TESTS:														
- BALANCING			6.00	9.8					0.26	0.3			6.26	1.1
- DRESSING							12.00	11.3					12.00	2.2
- UNDRESSING							8.00	7.5					8.00	1.5
NITAL ETCH							0.22	0.2					0.22	0.0
COPPER SULFATE TEST							0.03	0.0					0.03	0.0
ASSEMBLY/MODIFY	23.25	17.2											23.25	4.2
OIL ANALYSIS					2.00	2.6							2.00	0.4
TOTAL	134.80	100.0	61.00	100.0	76.01	100.0	106.05	100.0	84.68	100.0	88.01	100.0	550.55	100.0
1/ SEE ALSO TABLE A-1 - "ELECTRICAL/ELECTRONIC"														

TABLE A- 5
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 1 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: MACHINING

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
SHAPING	1.00	0.6			0.14	0.1	0.80	0.5	0.44	0.2	1.32	0.8	3.70	0.4
GRINDING:														
- INTERNAL	8.48	5.2	3.70	4.4	10.72	10.9	5.96	3.7	10.88	3.8	8.79	5.4	48.53	5.1
- EXTERNAL	12.48	7.6	7.58	9.1	9.48	9.7	15.92	9.9	29.84	10.5	33.29	20.3	108.59	11.4
- SURFACE	3.92	2.4	2.53	3.0	2.95	3.0	4.99	3.1	2.19	0.8	4.51	2.8	21.09	2.2
- ELECTROLYTIC	1.92	1.2			1.70	1.7	0.93	0.6	0.25	0.1	0.10	0.1	4.90	0.5
MILLING:														
- POCKET	6.32	3.9	1.15	1.4	2.94	3.0	13.40	8.3	13.41	4.7	3.87	2.4	41.09	4.3
- GANG	5.68	3.5	4.15	5.0			0.14	0.1	4.26	1.5	1.50	0.9	15.73	1.6
- ANGULAR	5.04	3.1	8.97	10.7	3.08	3.1	7.92	4.9	13.10	4.6	3.42	2.1	41.53	4.3
- INDEX	5.68	3.5	6.41	7.7	2.80	2.9	1.74	1.1	9.27	3.3	3.59	2.2	29.49	3.1
- SPECIAL	5.68	3.5	2.67	3.2	7.00	7.1	1.78	1.1	12.05	4.2	11.69	7.1	40.87	4.3
ELECTRICAL DISCHARGE MACHINE	4.92	3.0			2.21	2.3	4.47	2.8	0.95	0.3	2.01	1.2	14.56	1.5
TURNING	21.20	12.9	17.51	21.0	14.84	15.1	17.29	10.8	26.88	9.4	15.47	9.4	113.19	11.9

TABLE A-5
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 2 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: MACHINING

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
BORING/JIG BORING	9.92	6.0	10.77	12.9	11.31	11.5	7.04	4.4	19.34	6.8	24.08	14.7	82.46	8.6
FACING	3.92	2.4	3.02	3.6	1.68	1.7	6.80	4.2	7.59	2.7	5.44	3.3	28.45	3.0
TAPPING	5.20	3.2	1.77	2.1	1.12	1.1	2.19	1.4	5.50	1.9	3.12	1.9	18.90	2.0
THREADING	3.56	2.2	2.46	2.9	1.82	1.9	1.14	0.7	2.94	1.0	1.78	1.1	13.70	1.4
SUPER FINISHING	1.92	1.2	1.13	1.4	0.55	0.6	0.15	0.1	2.15	0.8	0.73	0.4	6.63	0.7
LAPPING									4.88	1.7			4.88	0.5
DRILLING/SLOTING	9.48	5.8	2.55	3.1	7.22	7.4	7.44	4.6	35.31	12.4	19.69	12.0	81.69	8.6
HONING	4.28	2.6	0.61	0.7	0.65	0.7	2.73	1.7	8.10	2.8	0.51	0.3	16.88	1.8
PUNCHING									1.18	0.4			1.18	0.1
SPOT FACING	4.56	2.8	0.30	0.4	0.45	0.5	0.33	0.2	5.67	2.0	2.41	1.5	13.72	1.4
ENGRAVING									1.55	0.5			1.55	0.2
COUNTER-SINKING	4.56	2.8	0.30	0.4	0.62	0.6	0.52	0.3	10.04	3.5	3.12	1.9	19.16	2.0
VALVE GRINDING					2.21	2.3			0.22	0.1			2.43	0.3
DEBURRING									0.29	0.1			0.29	0.0
MODIFICATION/REPAIR OF TOOLING	15.84	9.7	1.41	1.7	7.17	7.3	6.66	4.1	8.57	3.0	3.60	2.2	43.25	4.5

TABLE A-5
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 3 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: MACHINING

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
MAINTAIN RESTRIKE DIES							1.74	1.1					1.74	0.2
RESTRIKE (HOT FORMING) OF AIRCRAFT ENGINE NOZZLE GUIDE VANES							1.15	0.7					1.15	0.1
REPLACE:														
- BUSHINGS	4.20	2.6	1.53	1.8	2.00	2.0	2.05	1.3	6.82	2.4	6.42	3.9	23.02	2.4
- BEARINGS	4.20	2.6	0.59	0.7	0.62	0.6	1.54	1.0	15.91	5.6	0.81	0.5	23.67	2.5
- FITTINGS	1.00	0.6	1.15	1.4	0.85	0.9	1.03	0.6	15.89	5.6	0.46	0.3	20.38	2.1
- TRANSFER TUBES	1.92	1.2					0.69	0.4	5.65	2.0			8.26	0.9
- HELICOILS/INSERTS			0.54	0.6					1.54	0.5			2.08	0.2
- GUIDES	2.56	1.6					0.69	0.4	0.20	0.1			3.45	0.4
- CONE SEATS	0.64	0.4					0.69	0.4					1.33	0.1
- STUDS	3.92	2.4	0.67	0.8	0.17	0.2	0.49	0.3	2.17	0.8	2.17	1.3	9.59	1.0
METALLIZE							20.00	12.4					20.00	2.1
REMOVE/REWORK/INSTALL CATAPULT/ARRESTING GEAR							20.25	12.6					20.25	2.1

TABLE A- 5
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 4 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: MACHINING

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
ELECTRON BEAM WELDING					1.70	1.7							1.70	0.2
TOTAL	164.00	100.0	83.47	100.0	98.00	100.0	160.66	100.0	285.03	100.0	163.90	100.0	955.06	100.0

TABLE A-6
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 1 OF 1

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: HYDRAULIC/PNEUMATIC

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
DISASSEMBLE	36.89	16.9	12.17	14.1	4.00	10.0	14.58	21.8	9.82	9.4	4.50	10.0	81.96	14.6
CLEAN	11.85	5.4	6.76	7.9	1.52	3.8	3.46	5.2	3.52	3.4	1.35	3.0	28.46	5.1
INSPECT	14.94	6.9	3.45	4.0	2.28	5.7	3.65	5.4	10.13	9.6	4.50	10.0	38.95	6.9
REPAIR/REWORK	32.72	15.0	9.37	10.9	9.60	24.0	8.62	12.9	13.77	13.1	7.65	17.0	81.73	14.6
MODIFY	9.85	4.5	2.85	3.3	1.20	3.0	2.72	4.1	9.84	9.4	2.25	5.0	28.71	5.1
REASSEMBLE/BALANCE	64.81	29.7	34.98	40.7	7.20	18.0	23.16	34.6	39.68	37.8	13.50	30.0	183.33	32.7
TEST	46.94	21.5	16.43	19.1	14.20	35.5	10.82	16.1	18.23	17.4	11.25	25.0	117.87	21.0
TOTAL	218.00	100.0	86.01	100.0	40.00	100.0	67.01	100.0	104.99	100.0	45.00	100.0	561.01	100.0

TABLE A- 7
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 1 OF 2

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: STRIP/FINISH/PAINT

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
CLEANING:														
- STRIPPING	19.60	19.8	14.80	18.5	13.00	8.9	1.29	2.3	35.39	21.2	13.88	15.3	97.96	15.3
- DEGREASING			0.82	1.0	2.68	1.8	0.24	0.4	3.21	1.9	0.66	0.7	7.61	1.2
- VACUBLASTING/SEED BLASTING			3.90	4.9	6.85	4.7			6.21	3.7			16.96	2.7
- CORROSION TREATING			3.11	3.9	2.40	1.6	0.57	1.0	7.00	4.2	0.17	0.2	13.25	2.1
- TANK SOAKING			2.15	2.7	1.25	0.9	0.24	0.4	0.54	0.3	1.32	1.5	5.50	0.9
- WATER SPRAY	2.80	2.8	2.00	2.5	9.25	6.3			4.45	2.7	2.20	2.4	20.70	3.2
- SCRAPING	2.80	2.8	1.00	1.3	4.59	3.1	0.57	1.0	2.69	1.6	2.80	3.1	14.45	2.3
- STEAMING	2.80	2.8	4.44	5.6	14.50	9.9	0.24	0.4	11.33	6.8	3.52	3.9	36.83	5.8
- MASKING									5.66	3.4			5.66	0.9
SEALING/CORROSION TREATMENT			1.45	1.8	2.50	1.7	10.65	18.7	4.32	2.6	1.70	1.9	20.62	3.2
PAINTING:														
- CLEANING	10.70	10.8	6.03	7.5	24.73	17.0	2.19	3.8	21.71	13.0	8.75	9.6	74.11	11.6
- MASKING/TAPING/ UNMASKING	15.30	15.4	14.55	18.2	24.72	17.0	11.40	20.0	18.32	11.0	16.31	17.9	100.60	15.7

TABLE A- 7
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 2 OF 2

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: STRIP/FINISH/PAINT

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
- DOPING FABRIC	2.40	2.4											2.40	0.4
- SANDING									5.13	3.1			5.13	0.8
- PAINTING	31.90	32.2	21.14	26.4	26.00	17.8	14.25	25.0	25.91	15.5	23.11	25.4	142.31	22.2
REPAIR/RECONDITION OLD FABRIC SURFACES														
APPLY MARKINGS/DECALS	10.70	10.8	4.61	5.8	8.53	5.9	10.32	18.1	11.95	7.2	16.58	18.2	62.69	9.8
MANUFACTURE DECALS/ID PLATES					4.75	3.3	4.32	7.6					9.07	1.4
POWDER COATING/CODEP PROCESS/BLACK OXIDE							0.72	1.3	3.20	2.0			3.92	0.6
TOTAL	99.00	100.0	80.00	100.0	145.75	100.0	57.00	100.0	167.02	100.0	91.00	100.0	639.77	100.0

TABLE A- 2
 PRODUCTION SHOPS SURVEY
 (Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 1 OF 1

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: DISASSEMBLE/ASSEMBLE

NAVAIREWORKFAC MANU TECH OPERATION	ALAMEDA		CHERRY POINT		JACKSONVILLE		NORFOLK		NORTH ISLAND		PENSACOLA		TOTAL	
	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%
DISASSEMBLE TO:														
- TEST/CHECK	29.98	9.1	24.97	9.1	22.86	15.0	18.20	6.1	33.97	10.0	26.28	14.2	156.26	9.9
- ROUTE FOR REWORK	46.89	14.2	22.06	8.1	19.34	12.7	12.55	4.2	18.10	5.3	13.72	7.4	132.66	8.4
- ACCESS OTHER PARTS/ AREAS	28.42	8.6	6.37	2.3	8.15	5.4	16.97	5.7	9.27	2.7	11.18	6.1	80.36	5.1
- REPAIR	17.12	5.2	20.00	7.3	10.09	6.6	16.40	5.5	30.71	9.0	14.23	7.7	108.55	6.9
- REWORK	21.14	6.4	20.19	7.4	8.45	5.6	14.46	4.9	20.69	6.1	34.95	18.9	119.88	7.6
- OVERHAUL	6.35	1.9	9.00	3.3	3.30	2.2	20.82	7.0	20.46	6.0	7.85	4.3	67.78	4.3
- MODIFY	15.75	4.8	30.27	11.1	2.20	1.4	15.90	5.4	17.26	5.1	6.80	3.7	88.18	5.6
- COMPLY WITH TECHNICAL DIRECTIVES	20.59	6.2	16.13	5.9	7.54	5.0	30.48	10.3	31.81	9.3	9.64	5.2	116.19	7.4
- TREAT CORROSION	3.60	1.1	2.73	1.0	0.99	0.7	7.61	2.6	4.60	1.3	4.54	2.5	24.07	1.5
- BACK-ROB							1.80	0.6					1.80	0.1
ASSEMBLE	140.18	42.5	121.75	44.5	69.08	45.4	139.89	47.1	154.42	45.2	55.50	30.1	680.82	43.1
BALANCING							1.92	0.6					1.92	0.1
TOTAL	330.02	100.0	273.47	100.0	152.00	100.0	297.00	100.0	341.29	100.0	184.69	100.0	1578.47	100.0